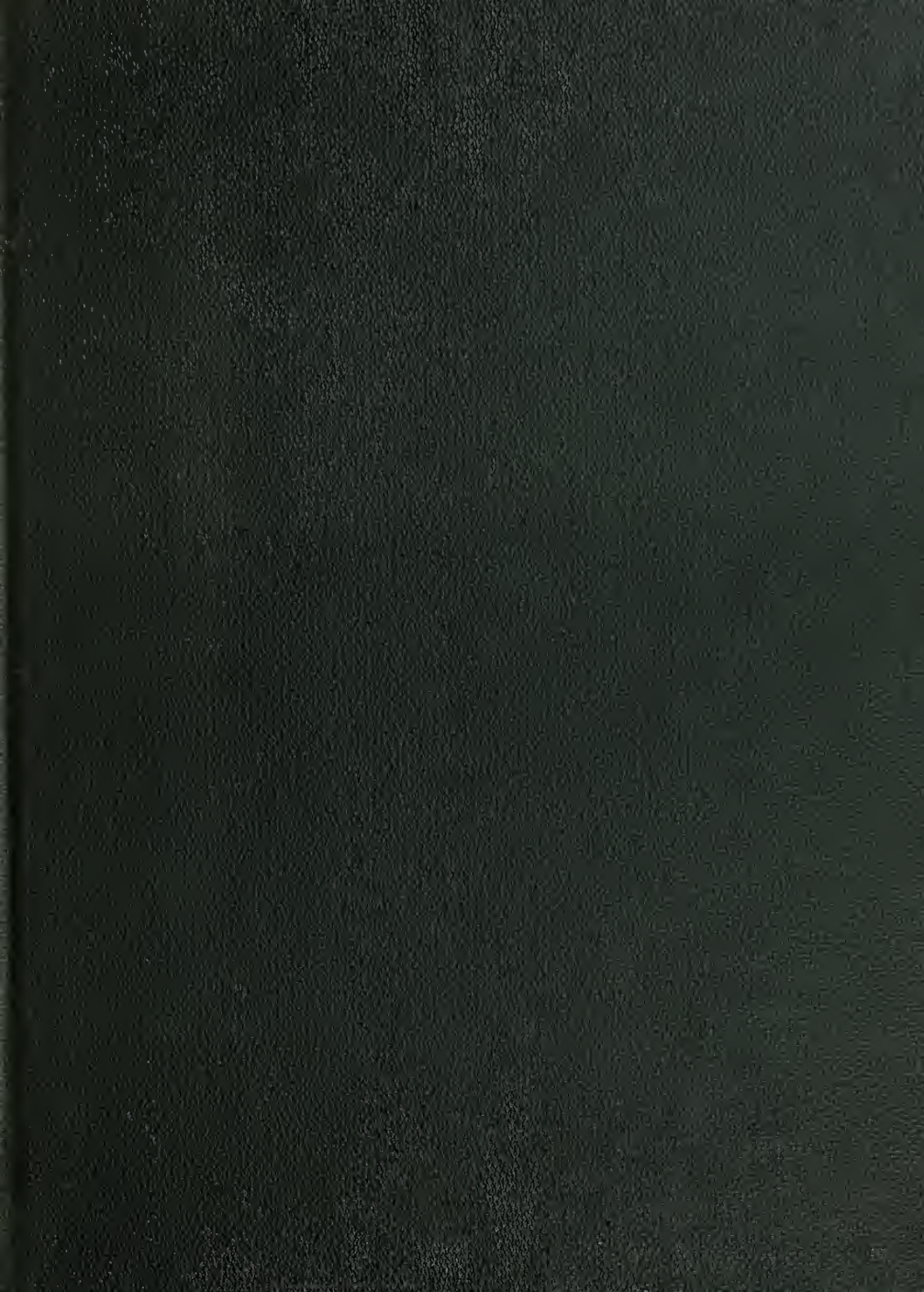


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ANNUAL REPORT  
ON  
THE CONTROL OF WHITE PINE BLISTER RUST  
IN  
CALIFORNIA AND OREGON  
FOR THE  
CALENDAR YEAR 1951

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## PART I

### BLISTER RUST CONTROL IN THE PACIFIC COAST PROJECT

#### HIGHLIGHTS OF 1951

By

Thomas H. Harris, Project Leader

#### Agencies Participating

The White Pine Blister Rust Control Project (Pacific Coast) includes all phases of control work in the States of Oregon and California. Work on federal lands is financed by allotments designated by Congress in the Agricultural Appropriation Act to the federal agencies having jurisdiction; work on private and state-owned lands is financed cooperatively by the States, the private owners, and the Federal Government and is administered by the Bureau of Entomology and Plant Quarantine.

The agencies and cooperators participating in the 1951 program remained the same as in 1950, namely:

U. S. Department of the Interior

National Park Service  
Bureau of Land Management

U. S. Department of Agriculture

U. S. Forest Service, Region 5  
U. S. Forest Service, Region 6  
Bureau of Entomology and Plant Quarantine

The State of California through its Division of Forestry

Stockton Box Company

Michigan-California Lumber Company

Indirect aid was given by the Departments of Agriculture of Oregon and California, the Oregon State Board of Forestry, and the College of Agriculture of the University of California.

#### Scope of Work

The scope of the work decreased only slightly from that in 1950. Although ribes eradication dropped 21 per cent in acres worked, the scope of pine appraisal surveys increased 48 per cent, and disease surveys were broadened.

Allotments for control work for fiscal year 1952 were as follows:

State of California	\$ 168,437
Michigan-California Lumber Company	2,000
Stockton Box Company	200
National Park Service	294,533
Bureau of Land Management	45,000
Forest Service, R-6	60,000
Forest Service, R-5	425,000
Bureau of Entomology and Plant Quarantine	<u>212,000</u>
Total	\$1,207,170

California's large appropriation set the stage for the size of the co-operative project on state and privately owned lands. Since the State's appropriation act requires that its blister rust allotment be matched with federal funds, the Federal Government allotted an equivalent sum. California through its Division of Forestry (Department of Natural Resources) has encouraged the control of blister rust on private lands in the State and has taken an aggressive lead in determining the scope of the work. It has also shown an active interest in the economic aspects of the pine appraisal surveys and in the sugar pine economic study, of whose advisory committee it is an important member. Without the very real contributions of the State both in money and in helpful interest and advice, the cooperative project would be largely ineffective. There is no cooperative project in Oregon.

In addition the States of California and Oregon contributed indirect aid in the amount of \$23,851, which includes the services of two California Youth Authority camps assigned to ribes eradication work and valued at \$16,351. The allotments for control work for last fiscal year (1951) amounted to \$1,263,337.

The Pacific Coast Project is engaged in a reappraisal of control areas based on principles of local control and of the economic evaluation of white pine stands. This reappraisal, now about 80 per cent complete, has been given high priority during the last two years. In an effort to get as much of this work done in 1951 as possible and to complete the preparation of contract areas for advertising in 1952, the active field season was extended in the fall three weeks later than usual.

A new Memorandum of Understanding covering working relationships in blister rust control was signed in April by the Bureau of Land Management (Department of the Interior) and the Bureau of Entomology and Plant Quarantine.

In July a new Memorandum of Understanding covering blister rust control activities was entered into by the Forest Service of Region 5 (California) and the Bureau of Entomology and Plant Quarantine. The new agreement defines Forest Service responsibility to lie chiefly in the field of sugar pine management, the delineation and selection of sugar pine management areas, and the preparation of management plans for those areas. The Bureau, on the other hand, undertakes responsibility for technical direction and coordination of control work on land administered by the Forest Service and for the administration of ribes eradication on such land.

The regionalization of the Bureau of Entomology and Plant Quarantine took place on July 1. The Bureau's Western Region (IV), comprising seven western states, was set up in Berkeley in space jointly occupied with the Project at the latter's address.

### Ribes Eradication

In the 1951 season ribes were destroyed on 55,311 acres bearing white pine stands and 31,059 acres were inspected by ribes surveys and found to require no ribes removal. Thus a total of 86,370 acres was given protective treatment. Of the acres on which ribes were destroyed 38 per cent was initial work and 62 per cent reeradication.

A comparison with accomplishments in 1950 shows that the acres worked (acres on which ribes were destroyed) decreased 22 per cent. The number of man days fell 27 per cent. The decreases may be accounted for by several trends: (1) Since contractors use noticeably fewer man days in doing the same amount of work than force-account labor, an increase in contract work would reflect fewer man days. The amount of contract work increased from 49 per cent in 1950 to 55 per cent in 1951. (2) Pine appraisal surveys were sharply emphasized by both the Bureau and the Forest Service and were notably expanded; man days spent on this activity were of course not available for other aspects of control work. The Bureau also increased the scope of disease surveys, an action which had a similar effect. (3) Forest fires in August and September diverted camp crews from ribes eradication to fire fighting.

<u>Calendar Year</u>	<u>Acres Protected</u>			<u>Man Days</u>	<u>Ribes Destroyed</u>
	<u>Worked</u>	<u>Inspected</u>	<u>Total</u>		
1951	55,311	31,059	86,370	35,292	7,686,000
1950	70,770	50,433	121,203	48,114	9,076,000

Ribes eradication under the contract procedure continued to be directed at the objective of doing as much work by this means as is consistent with good operational management. Fifty-five per cent of all the work was contracted, which is an increase of 6 per cent over 1950. The average bid price was \$6.08 an acre. Contractors worked 30,323 acres and were paid \$184,272. Contract work runs from 25 to 40 per cent less costly than work by hired labor, and is normally of better quality.

Hired labor quartered in government subsisted camps and convict labor accounted for the remaining 45 per cent of eradication work. The accompanying table lists the number of workers employed by each agency; all were free labor except 180 inmates of California's State Prison employed by the Forest Service and 26 delinquent youths contributed by the California Youth Authority and the California State Division of Forestry and used on the Bureau's cooperative project. Hired labor is better adapted to certain types of eradication work and is a source of potential contractors.

## SEASONAL EMPLOYMENT BY AGENCY

Operating Agency	No. of Camps	No. of Laborers	Percent of Job Handled by Contract
Bureau of E. P. Q.	7	60	71
Forest Service, R-5	4	180	71
Forest Service, R-6	1	14	88
National Park Service	6	250	11
Bureau of Land Management	2	17	56
Regional Totals	20	521	55

Two thousand four hundred acres were treated with the hormone-type herbicides, 2,4-D and 2,4,5-T, in foliage sprays and basal stem application. Ten truck-mounted power spray rigs were used by the National Park Service, Forest Service, and the Bureau. The Park Service used chemicals on over 800 acres of high-elevation white pine in Sequoia National Park. In southern Oregon the Bureau of Land Management treated Ribes bracteosum on 360 acres of stream type with a foliage spray of 2,4-D. Results of similar work in 1949 showed a complete kill where the chemical was properly applied. Chemical destruction of ribes continues to be an effective and economical method in dense populations and in situations where ribes are difficult to destroy by hand grubbing. Chemical treatment of 3,201,000 ribes required 3,128 man days of labor.

### Ribes Surveys

Systematic strip surveys for defining eradication work areas through the mapping of ribes population patterns were conducted on 107,000 acres. Similarly 62,000 acres of eradication work were inspected for conformance to control standards. These surveys are performed by the Bureau as a reimbursable technical service for the federal agency programs. Seventy-one per cent of the work was reimbursable.

### Sugar Pine Economic Study

The study of the economics of sugar pine management was carried further toward its conclusion by Dr. Henry J. Vaux, Associate Professor of Forestry, of the School of Forestry, University of California. In June a meeting of interested groups considered a level of sugar pine management proposed by Dr. Vaux as being a logical one to use in a test trial of his economic approach. On the basis of this tentative level he prepared new evaluation tables for rating pine stands and data on the probable size of the management program. The new material will be presented to the advisory committee for study at a meeting early in 1952. In the meantime the first set of preliminary evaluation tables has been in constant use by the Forest Service and the Bureau as an aid in selecting stands for protection against blister rust. The study should come out with definite recommendations and a tentative report in 1952.

### Pine Appraisal Surveys

The reappraisal of control areas in California in the light of local control and economic standards, a project that has been actively pushed during the



two previous years, received first priority in 1951. Since the total control job cannot be accurately appraised until this reexamination is completed, the need for prosecuting the latter to an early conclusion is apparent. According to prescribed methods the Bureau appraised 65,414 acres with 576 man days of labor. The Forest Service in California also appraised a large pine acreage. To date the job is about 80 per cent completed. Preliminary estimates indicate that present control areas will be reduced as a result of the appraisals by about 45 per cent (to about 1,000,000 acres). It is significant to note that the reduced areas will still contain about 85 per cent of the original sugar pine growing capacity. Furthermore, about 70 per cent of the new areas will have received ribes eradication as against 59 per cent of the present acreage. Fine appraisal surveys, except for current annual needs, should be completed in 1952.

In Oregon the Bureau of Land Management has been using an economic formula for several years and in 1951 surveyed 3,534 acres. Certain restricted areas in Oregon are also being recommended by the Bureau of Entomology and Plant Quarantine for limited local control.

#### Occurrence of Blister Rust - Disease Surveys

The year 1951 did not appear to be favorable for either local intensification or long distance spread of blister rust in California. Local intensification at known rust centers was light and few new infections were found. One discovery, however, extended the known range of rust on sugar pine southward in the Sierra Nevada 13 miles and established its presence in a new county and a new national forest. This was the finding of 84 trees with 343 cankers in the northern part of the Stanislaus National Forest in Calaveras County. This center of infection probably originated in 1944.

Special studies on the behavior of the disease that will benefit all control programs of the Pacific Coast were undertaken on the Rogue River National Forest. They were aimed at discovering the source of certain infections within control areas, at ascertaining ribes populations in infected stands, and at solving related problems. Analysis of data is now in progress and results should be available early in 1952. A total of 1,035 man days was spent on these studies and on scouting for the disease.

#### Informational Activities

Information concerning the Project was distributed through the media of motion pictures, literature, and an exhibit. The motion picture "King of the Softwoods" was shown 33 times to an aggregate audience of 3,050 persons including numerous exhibitions in the national parks. The illustrated booklet "Blister Rust--Scourge of Sugar Pines" was distributed widely, about 1,850 copies being placed in the hands of interested persons. Copies were distributed to the public libraries in the major cities and towns of California. The blister rust control exhibit placed at the annual State-wide conservation conference held this year in Berkeley was viewed by 500 delegates and visitors.

## Recruiting of Field Personnel

The Berkeley office again recruited laborers for the Park Service and Forest Service camps. About 850 applications were received and processed, from which 250 men were selected and assigned to the various field operations. Approximately 113 checkers and 12 pine appraisers were employed for the Bureau, most of the men being recruited from the colleges. The pine appraisers were nearly all forestry school graduates, and the checkers were mostly experienced blister rust workers or upper-division college men. The quality of the technical men was considered good this year. Although the effects of Selective Service and competition from private industries on employment were felt this year, the employment of fewer men because of the contract program more than offset the reduced number of men available.

TABLE 1  
SUMMARY OF RIBES ERADICATION BY AGENCY - 1951

Operating Agency	Acres Protected			Thousands of Ribes Destroyed	Men Days Expended			Per Acre Worked		
	Worked Area		Inspected and Requiring No Work		Eradicating Ribes Area	In-specting Area	Total	Ribes	Erad. Man Days	
	Initial Erad.	Reerad.								
U.S. Forest Service, R-6	929	4,172	1,356	6,457	105	1,077	370	1,447	21	0.21
U.S. Forest Service, R-5	10,788	5,565	1,486	17,839	4,000	12,074	1,322	13,396	245	0.74
National Park Service	3,037	12,045	15,035	30,117	1,904	10,963	769	11,732	126	0.73
Bureau of Land Management	3,382	1,609	5,629	10,620	102	1,574	525	2,099	20	0.31
EPQ-Coop.	2,999	10,785	7,553	21,337	1,575	5,349	1,269	6,618	114	0.39
Totals	21,135	34,176	31,059	86,370	7,686	31,037	4,255	35,292	138	0.56

TABLE 2  
SUMMARY OF RIBES ERADICATION BY TYPE OF WORK - 1951

Type of Work	Acres Protected	Thousands of Ribes Destroyed	Man Days Expended	Per Acre	
				Ribes	Man Days
Inspected and Requiring No Work	31,059	-	4,255	-	0.14
Hand Eradication by Camps	22,583	2,183	18,041	97	0.80
Chemical Eradication by Camps	2,405	3,201	3,128	1,330	1.31
Contract Work *	30,323	2,302	9,868	76	0.32
Totals	86,370	7,686	35,292	89	0.41

\* The average contract bid price was \$6.08 per acre.

TABLE 3

STATUS OF BLISTER RUST CONTROL BY LAND OWNERSHIP, PACIFIC COAST PROJECT,  
AS OF DECEMBER 31, 1951

Land Ownership	Acres in Control Area	First Working		Second Working Acres	Other Workings Acres	On Maintenance		Remaining Work Re-	
		Acres	Per Cent			Acres	Per Cent	Un- worked Acres	quiring Rework Acres
California:									
National Forest	623,680	359,252	58	180,671	129,339	55,254	9	264,428	303,998
National Park	172,652	116,647	68	88,067	51,620	79,115	46	56,005	37,532
State and Private	618,596	362,901	59	169,583	114,252	49,762	8	255,695	313,139
Oregon:									
National Forest	93,192	83,227	89	48,652	29,441	20,223	22	9,965	63,004
National Park	3,782	3,632	96	1,145	416	3,371	89	150	261
Bureau of Land Management	51,579	44,632	87	27,532	1,609	19,286	37	6,947	25,346
State and Private	19,510	17,744	91	6,242	2,283	4,241	22	1,766	13,503
Totals	1,582,991	988,035	62	521,892	328,960	231,252	15	594,956	756,783



## PART II

### LEADERSHIP, COORDINATION, AND TECHNICAL DIRECTION OF BLISTER RUST CONTROL BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE IN 1951

By

Neil J. MacGregor, District Leader

#### PURPOSE

In the Lea Act of 1940 Congress delegated to the Bureau of Entomology and Plant Quarantine the responsibility for leadership, coordination, and technical direction of all white pine blister rust control. In addition, the Bureau was charged with the collection, summarization, and presentation of the basic field data.

During 1951 the blister rust control program was continued by several federal agencies, each conducting work programs on lands within its jurisdiction. Two states, California and Oregon, and two private agencies also participated through contributions of facilitating services and financial aid.

#### ORGANIZATION

The purpose of this project was carried out by the Bureau through its technical staff. During the winter and spring representatives of various cooperating agencies were in consultation with Bureau staff members at blister rust control project headquarters in Berkeley, California, to formulate the season's work plans. Throughout the field season, staff members were present on all operations and provided technical advice and assistance in coordinating the blister rust control program on federal lands with that on state and private lands, and with regional objectives. Pathologic, ecologic, and chemical information pertaining to blister rust control were collected by staff members and distributed to cooperators.

#### Memoranda of Agreement

The cooperative agreements defining the responsibilities of and the relationships between the Bureau and other agencies, federal, state, and private, were reviewed and, in two instances, revised.

U. S. Forest Service, Region 5: The 1937 Memorandum of Agreement with the U. S. Forest Service, Region 5, was superseded by a Memorandum of Understanding dated July 27, 1951. The new agreement redefines the responsibilities of the two agencies and spells out more explicitly the duties of each. A digest of its more important aspects follows.



The Forest Service, acting in the capacity of a land management agency, is responsible on lands under its jurisdiction for:

1. Selecting areas for sugar pine management and blister rust control.
2. Preparing management plans for the areas selected.
3. Financing, directly or through reimbursement, all blister rust control work.

The Bureau, functioning as a technical agency, assumes responsibility for the administration of the ribes eradication program on national forest land and performs the following duties:

1. Administration and supervision, through a Bureau staff member acting as a representative of the Forest Service, of all ribes eradication work.
2. Administration and supervision of all checking activities.
3. Supplying technical advice, assistance, and direction to the Forest Service.

Bureau of Land Management: The 1944 Memorandum of Understanding with the Bureau of Land Management was revised in April 1951 in order to define more clearly the responsibilities of both agencies, and to bring the agreement up to date with regard to present operating conditions.

### Reorganization

In 1951 the Bureau of Entomology and Plant Quarantine regionalized its activities. The new organization is described briefly below.

Bureau: Formerly the Bureau was organized on a divisional basis, the direction of similar projects and activities through the United States being assigned to one of numerous divisions whose business and administrative headquarters were located in Washington, D.C.

The direction of the Bureau's regulatory and control operations and administrative functions are now consolidated under single administrative heads in five strategically located headquarters. Region IV, comprised of the seven western states, is headed by Warren V. Benedict, formerly in charge of the Pacific Coast Blister Rust Control Project. The Western Regional Office (Region IV) is located in Berkeley, California.

Project: At the time of the Bureau reorganization, the frame work of the Pacific Coast Blister Rust Control Project was modified so as to provide a more efficient and closely knit organization which would be better adapted to present operating practices.

The principal change was the designation of three extensive control areas and the assignment of each operation in the Project to one of them. A new system of titles was also adopted.

T. H. Harris, formerly assistant project leader, assumed the duties of project leader, and C. P. Wessola those of assistant project leader. Wessola will also act as area leader of the Siskiyou-Cascade area. The Organization Chart, page 13, graphically illustrates the present organization of the Project.

### Wage Rates

The wage rates which were established by "The Classification Act of 1949" for the classified grades were retained during the bulk of the season. New rates were made effective July 8 and were in effect throughout the remainder of the 1951 season. For unallocated jobs a survey is conducted annually by the Forest Service Wage Board. This office accepts the wage scale established by that board. Unallocated job rates for the Yosemite and Sequoia-Kings Canyon operations were set by independent Park Service wage boards. The rates of pay used during the 1951 season for both classified and unclassified personnel are shown in the table "Rates of Pay for Seasonal Employees, 1951", page 14.

### Recruiting of Field Personnel

During the winter and spring, applications were solicited from college students throughout the United States. After the initial screening approximately 850 applicants for laborer jobs were considered. From these about 250 men were selected and assigned to operations, the majority going to camps in the national parks. An additional 200 applicants were referred to the Forest Service in other regions where labor shortages occurred.

The quality of laborers employed in 1951 compared favorably with that of recent years. A smaller percentage of experienced laborers was rehired, however, and the demands of Selective Service and an expanded industrial employment situation resulted in the employment of more men under 20 years of age and of fewer veterans than during the past three years. The minimum age limit of 18 years was again maintained without hardship.

The recruiting of checkers and pine appraisers was more difficult, principally because present control practices make it imperative that seasonal personnel in these categories be well above average in resourcefulness, intelligence, and conscientiousness. The more attractive wages offered by private industry added to the difficulty of the technician procurement problem.

Colleges throughout the nation, particularly the 25 leading forestry schools, supplied the bulk of the 117 checkers and 12 pine appraisers employed. Although the large proportion of inexperienced men imposed training and supervisory problems, the survey crews proved satisfactory.

In the past the eradication camps have provided an adequate back-log of experienced men from which it was possible to develop the required number

# ORGANIZATION CHART

## WHITE PINE BLISTER RUST CONTROL PROJECT (PACIFIC COAST)

Management and Direction  
 T. H. Harris, Project Leader  
 C. P. Wessela, Assistant Project Leader

Control Operations  
Area I (Siskiyou-Cascade)  
 C. P. Wessela, Area Leader

Operations  
Umpqua, Siskiyou  
 E. R. Bryan, Oper. Ldr.  
 Crater Lake, Rogue River  
 L. N. Anderson, Oper. Ldr.  
 Klamath, Shasta, Trinity  
 F. A. Patty, Oper. Ldr.

Surveys  
 N. J. MacGregor, Dist. Ldr.  
 H. A. Roberts, Control Aid

Control Operations  
Area II (North Sierra)  
 Benton Howard, Area Leader

Operations  
Lassen Park and Forest  
 J. N. Mitchell, Oper. Ldr.  
 Plumas  
 E. R. Ellis, Oper. Ldr.  
 Tahoe  
 R. R. Johnston, Oper. Ldr.  
 Eldorado  
 R. Sovulewski, Oper. Ldr.

Surveys  
 J. L. Wuotila, Control Aid  
 L. A. Paine, Control Aid

Control Operations  
Area III (South Sierra)  
 Roy Blomstrom, Area Leader

Operations  
Stanislaus  
 C. W. Fowler, Oper. Ldr.  
 Yosemite  
 S. D. Adams, Oper. Ldr.  
 Sierra  
 H. L. Mitchell, Oper. Ldr.  
 Sequoia-Kings Canyon Parks  
 Sequoia Forest  
 A. London, Oper. Ldr.

Surveys  
 A. J. Thompson, Dist. Ldr.  
 G. R. Tiers, Control Aid

Rates of Pay for Seasonal Employees  
1951

Classified Grades

Payroll Title and Field Operating Title (L/A Employees)	Per Annum Rate		Hourly Rate	
	Before	After	Before	After
	July 8	July 8	July 8	July 8
SUPERVISORY CONTROL AIDS (PLANT DISEASE)				
GS-6:	\$ 3450	\$ 3795	\$ 1.66	\$ 1.82
Camp Superintendent - Eradication				
Chief of Party - Reconnaissance				
Checker Foreman				
SUPERVISORY CONTROL AIDS (PLANT DISEASE)				
GS-5:	3100	3410	1.49	1.64
Foreman - Eradication				
Scout - Reconnaissance				
Senior Checker				
CONTROL AIDS (PLANT DISEASE) GS-4:	2875	3175	1.38	1.53
Assistant Foreman - Eradication				
Assistant Scout - Reconnaissance				
Assistant to Operation Supervisor				
Junior Checker				
CONTROL AIDS (PLANT DISEASE) GS-3:	2650	2950	1.27	1.42
Strawboss				

Unallocated Grades

COOKS, UNALLOCATED:		
IV - (Over 30 men)	\$ 3400	\$ 1.63
III - (Up to about 30 men)	3195	1.54
II - (Up to about 20 men)	2890	1.39
I - (Not over 10 men)	2770	1.33
COOK'S HELPER:	2360	1.13
(Flunky)		
CREWLEADERS:	3010	1.45
INSECT AND DISEASE CONTROL LABORERS - I:	2810	1.35
TRUCK DRIVERS:		
II - Stakeside	3225	1.55
I - Pickup	3050	1.47

of contractors. The expansion of the contract program and the corresponding reduction in the camp program has made it increasingly necessary to exploit other sources of contractors. This year information sheets were distributed on a nation-wide basis and the Project headquarter's office, acting as a clearing house, referred contractors to operations where they were most needed. Most of the contractors bid on Forest Service as well as on Bureau invitations.

The problem of securing an adequate supply of contractors is one which is becoming more pronounced. In its role as a coordinating agency, the Bureau feels the responsibility to its cooperators in this regard and is endeavoring to work out a satisfactory solution to the problem.

### Informational Activities

An informational program was conducted through the medium of motion pictures, literature distribution, and an exhibit. The film "King of the Softwoods" was shown 33 times to an aggregate audience of approximately 3,050 persons. These included tourists in the national parks, students in college and high school classrooms, civic organizations, conservation societies, and federal agencies. The blister rust brochure "Blister Rust--Scourge of Sugar Pines" was distributed widely, about 1,850 copies being placed in the hands of interested persons. Distribution was likewise made to the public libraries in the cities and major towns in California. An exhibit portraying the threat of blister rust to the sugar pine resource of California was placed at the annual State-wide conservation conference held in Berkeley. It was viewed by about 500 delegates and visitors from 57 government conservation agencies, 46 private conservation organizations, and 52 general civic organizations.

### ACCOMPLISHMENTS IN LEADERSHIP AND COORDINATION

The Bureau provided the necessary technical direction to coordinate the white pine blister rust programs of the following participating agencies:

1. Federal agencies engaging in control programs:
  - a. Bureau of Entomology and Plant Quarantine
  - b. U. S. Forest Service
  - c. National Park Service
  - d. Bureau of Land Management
2. State and private agencies that contribute financial aid in the cooperative program:
  - a. State of California (Division of Forestry, Department of Natural Resources). Yearly contributions have been made since 1941. The appropriation for the fiscal year July 1, 1951 to June 30, 1952 is \$168,437. In addition to the blister rust appropriation the State's Division of Forestry assigned 1,737 man days of CYA labor to blister rust control work valued at \$16,351.

- b. The Michigan-California Lumber Company has made a yearly contribution of \$2,000 since 1942.
  - c. The Stockton Box Company made a contribution of \$200.
3. Agencies contributing services and facilities under Memoranda of Agreement with the Bureau of Entomology and Plant Quarantine:

<u>Agency</u>	<u>Value of Contributed Facilities and Services</u>
a. State of California	
(1) Department of Natural Resources, Division of Forestry	Services of two CYA camps valued at \$16,351.
(2) Department of Agriculture	\$4,000
(3) College of Agriculture, University of California	\$2,000
(4) Botanical Gardens, University of California	\$ 500
b. State of Oregon	
(1) Oregon State Board of Forestry	\$ 500
(2) Department of Agriculture, Bureau of Plant Industry	\$ 500

#### ACCOMPLISHMENTS IN TECHNICAL DIRECTION

##### Contract Ribes Eradication

In 1951, 30,323 acres, 55 per cent of the total area worked, were contracted. The meaning of the term "area worked" differs from that of "area protected". The former refers to areas on which actual ribes eradication was performed while the latter includes areas currently checked and found meeting control standards without immediate ribes eradication work. The average price per acre paid to the contractor was \$6.08. The graph on page 17 illustrates the trend in area worked by this procedure by the various agencies.

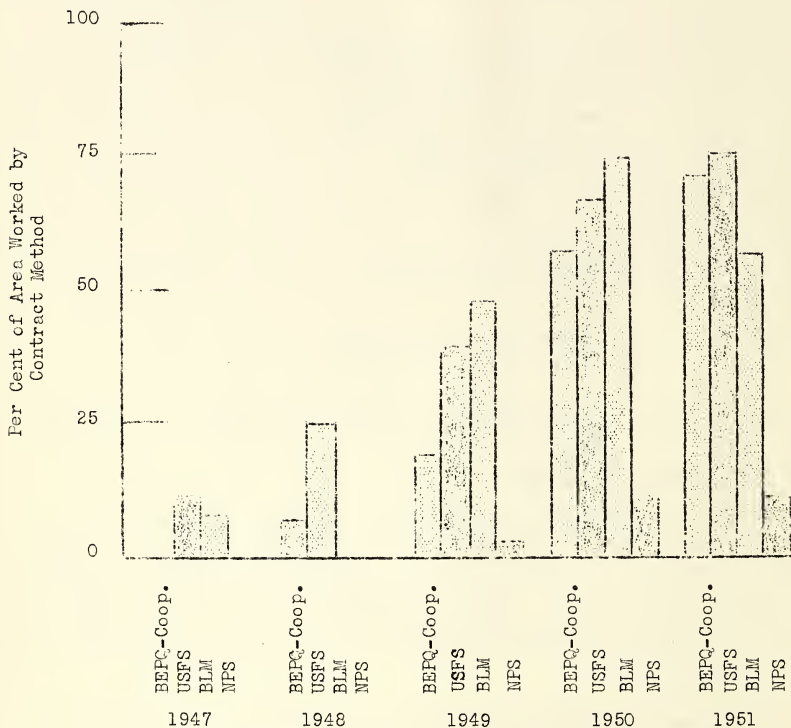
During the spring of 1951 an exhaustive cost analysis of the 1950 contract program was made by Robert Sovulewski, operation leader. A summary of the highlights of the study follows:

1. Average bid prices, the amounts paid to contractors, ranged from \$2.98 to \$8.00 per acre. The project average was \$4.66.



2. The over-all cost of administering the contract program ranged, by operation, from \$0.69 to \$3.20 per acre. The project average was \$1.98.
3. Checking costs, the major administrative item, ranged, by operation, from \$0.40 to \$2.30 per acre. The project average was \$1.14. (These figures are in terms of "worked acres" rather than "acres protected", for which they would have been lower.)
4. All costs considered, contracting effects a saving of 20 to 30 per cent as compared with camp work.

Drawing upon the experience of two seasons of full scale contract programs, it is possible to generalize somewhat with regard to developments and possible trends.



Graph Showing Increase in Area Worked by Contract Method Since 1947



Checking: Checking costs are higher than with camp work and may continue to be so. This results mainly from the amount of rechecking necessary on contract lots and from the higher percentage of sample taken. The first problem is being solved to some extent by making a service charge of \$0.25 per acre for inspections subsequent to the second check. An increase in this charge may prove desirable. All phases of the checking program including that of the percentage of sample necessary, will be examined closely during the winter of 1951-1952.

Eradication: On the whole, contracting results in a better job of eradication than does camp work. This should continue to be true, but does not necessarily indicate a superiority of contract as compared with force-account labor. It suggests, rather, that the demands of the contract procedure on the eradicator, and the more exacting checking practices employed in contract work require more thorough and careful work. Some chemical eradication techniques have been successfully adapted to the contract method and offer a solution to the problem of some contractors being unduly influenced in their bidding by the occurrence of localized, heavy ribes concentrations. To date, the basal stem and decapitation methods have proved the most satisfactory.

Personnel: A successful contract program is highly dependent upon having an optimum number of bidders available. An excessive number can be as unfavorable as too few, for as excessive competition forces prices down and the contractor's return approaches a marginal level, the quality of his work will fall off and an excessive amount of rechecking will result. Of course, as unsuccessful bidders drop out of the picture the situation will tend to right itself. However, the short field season and the high yearly turnover do not allow time for a satisfactory equilibrium to become established.

The administration of the contract program is further complicated by the increasing necessity of training inexperienced men and allowing them the opportunity to acquire the experience necessary to their becoming successful, and hence valuable contractors. (In the past, the force-account camps have been a source of experienced contractors.) An important early-season job of operation personnel is the training of green contractors.

General: The full impact of the contract method on the over-all control program is becoming increasingly evident. It affords a greater operating flexibility; it is better adapted to the local control practices currently employed; it results in better eradication work; and it costs less. It is possible, of course, that bid prices will increase. To some extent this would be the normal consequence of approaching a maintenance status on more and more areas, and would reflect the contractor's increasing awareness of the difficulty involved in meeting the stricter standards.

Contracting does effect higher checking costs and does add many administrative problems. However, these are largely offset by the

reduction in the number of seasonal overhead required, the smaller inventory of equipment and supplies necessary, and the elimination of many of the personnel problems associated with force-account labor.

### Checking

During 1951 the Bureau continued to handle all checking activities on a reimbursable basis for the several federal agencies doing control work. In the Pacific Coast Project 117 checkers were employed, 103 in California, and 14 in Oregon. College students and a few experienced men made up the bulk of the crews.

Approximately one-half of the area checked this year was given a post check. Regular and advance checking accounted for about 35 per cent and 15 per cent respectively. Fewer experienced men were available, but as a result of stepped-up training and supervisory programs a high standard of checking was maintained.

Changes in operating practices and conditions, particularly those resulting from: (1) the application of the local control concept; (2) the general adoption of the contract method of ribes eradication; and (3) the increasing proportion of control unit area approaching a maintenance status, have had a considerable effect upon checking methods and problems. The impact of these three factors is discussed below.

Local Control: The effect of local control stems from the trend toward smaller, more irregular, and more nearly homogeneous work lots. The smaller more irregular lots mean shorter check strips which must be less mechanically spaced than previously. Also, in order to provide results of the same dependability, a higher percentage of sample is necessary on the small lots. These factors tend to increase the cost of checking. (Checking costs are found to be roughly proportional to the per cent of sample.)

The greater homogeneity, considering such factors as ground cover, timber type, and ribes populations, has the effect of rendering the average expressions of checking data, ribes per acre and feet of live stem per acre, statistically more dependable.

Solutions to the small lot and irregular lot problems are being sought through variations and improvements on the standard checking method. Traverse methods of checking and more applicable strip placement techniques are being explored.

Contract Checking: Contract checking makes new demands of the checker. In addition to determining if contract specifications have been met, he is called upon to supply data from which the size of the lot may be determined and upon which payment to the contractor is based. The frequent irregularity of the lot adds to the difficulty of this job. Checkers capable of greater initiative, dependability, and general capability are needed for this type of work. The need for more thorough training and supervision is also accentuated.

Certain unique problems are imposed by the contract method. Among these are:

1. The regular checking work load is highly variable and relatively unpredictable.
2. Requests for checking from the contractors who have completed their eradication work frequently occur simultaneously in widely separated and remote areas.
3. The proportion of rechecking is higher. (During the 1950 and 1951 seasons approximately 25 per cent of the total time spent on regular checking was devoted to rechecking.
4. The percentage of sample is higher.

These factors all tend to increase checking cost. The effect is both direct, as in the per cent of sample and the amount of recheck, and indirect, as in the work load variability where the immediate effect is that of influencing the planning of an efficient checking program.

Maintenance Checking: The related problems of checking in areas of light ribes populations and of finding the small, well-screened bushes are receiving more careful consideration as maintenance conditions are approached on an increasing proportion of the control area. Misses by checkers in the small bush size classes have always been a problem. Bushes in this group now assume a new importance as it becomes necessary to meet rigid standards more frequently.

In order to find a greater proportion of these "problem bushes" a checker must not only employ the best searching techniques, but must do a more thorough and painstaking job. This, of course, greatly increases checking costs. It is also felt that a higher percentage of sample and better adapted sampling methods are necessary in this type of checking. Several variations on the standard procedure were given field tests during 1951. The selection of better seasonal employees and intensified training and supervisory programs are also necessary.

General: To an increasingly greater extent the success of the overall control program is dependent upon accurate, consistent, and reliable checking data. Checking of this quality will generally cost more and requires seasonal personnel of the highest available calibre to whom intensive training and thorough supervision must be given. Checking methods have been and will continue to be adapted to new conditions.

#### Chemical Ribes Eradication

Application of 2,4-D and 2,4,5-T sprays using power spray equipment was standard operating procedure for treating heavy ribes concentrations. Accomplishments of the power spray project for 1951 are summarized in the regional summary tables. A total of nine power spray units were used, four truck-mounted units and one semi-portable unit by the Forest Service,

two truck-mounted units by the National Park Service, and two truck-mounted units by the Bureau. Knapsack and hand type applicators were widely used for chemical treatment of areas inaccessible or too small to justify use of power equipment. In Sequoia-Kings Canyon National Parks a high-country area comprising 590 acres was worked entirely with chemicals applied from knapsack and hand units.

During June and July, the active growing season for ribes, aqueous foliage sprays were used almost exclusively. After August 1, basal stem treatment utilizing oil concentrates of 2,4-D and 2,4,5-T were used until the end of the field season. Oregon operations used only 2,4,5-T. The North Sierra operation used a mixture of 500 ppm 2,4-D and 2,500 ppm 2,4,5-T in foliage sprays and a 5 per cent mixture of half and half in aromatic oils for basal stem treatment. The remainder of the project used 2,4-D with the exception of Sequoia Park where 2,4,5-T was utilized to treat Ribes montigenum and R. tularensense. Aqueous sprays were at concentrations of 500 ppm for 2,4-D; 2,500 to 3,000 ppm for 2,4,5-T. Basal sprays for all operations were 5 per cent total acid in oil (diesel or stove oil). Where decapitation and stump treatment was performed a 1 per cent acid in oil solution was used to treat the cut surfaces of the stumps. In compounding aqueous sprays a 1 per cent summer oil emulsion was used to improve the wetting and penetrating characteristics of the final spray solution. In addition the emulsion provided a white temporary marker (lasting up to half an hour) to aid the nozzlemen to obtain complete foliage wetting.

Variations in percentage of kill were again noted on ribes that were chemically treated. In most cases percentage of kill was a satisfactory 90 plus. Where it dropped below 90 the variable factors of differential wetting with aqueous sprays, adverse site factors, time of treatment, and age of bushes treated are still problems to be solved. The chemical treatment of troublesome ribes is still the most satisfactory method of eradication.

Use of power spray equipment is on the decline because most areas within control units suitable to this treatment are reduced in ribes populations to where they can be handled by hand methods. Use of knapsack type applicators will increase, especially for high-country work and where occasional small patches of heavy regeneration makes chemical treatment more economical than hand eradication. Basal treatments with oil solutions will continue to be applicable to troublesome large bushes and rockbound bushes for which other eradication methods are impracticable. Ribes intergrowing with brush can also be basal treated more economically than by hand eradication. Speed of treatment is increased 1-1/2 to 2 times over hand eradication.

#### Scouting and Disease Survey

Another year passed with no general spread of white pine blister rust from infected white pine to ribes in the Pacific Coast Project area. The number of ribes found to be infected when compared with the number of bushes examined was the smallest in 1951 that it has been for many years. No infection was found on ribes at many of the pine infection centers examined. Rust on the relatively few infected ribes that were found was generally light and in most cases only one to a few leaves were involved. Telial



production was the lightest noted in many years. A very high percentage of the rust spots failed to develop telia. Intensification of the rust on ribes leaves through September was slight to absent at all but two infection centers examined.

With one exception, all rusted ribes found were in the immediate vicinity of sporulating cankers. This one exception occurred at the Letts Valley area on the Mendocino National Forest. There are three small meadows in this area each traversed by a small stream. The portion of the meadows adjacent to the stream is somewhat swampy and supports numerous clumps of Ribes inerme bushes. There are a few small sugar pine trees bordering the meadow. This is an excellent site for the rust to make its incidence during a long distance spread. Numerous ribes bushes were found to be infected, and this was the only spot found within the Project area where the rust had produced a heavy crop of telia during the 1951 season.

In addition to Letts Valley one small area in the South Fork of Montgomery Creek drainage showed heavy intensification of the rust. These were the only two spots found within the Project area where heavy intensification of the rust occurred on ribes leaves. A light rain occurred in the Montgomery Creek drainage about the first of September, and when this area was examined on September 14 a new crop of uredia was just maturing. There was a rather heavy intensification of the rust on leaves of R. roezli growing just above the road crossing at the South Fork of Montgomery Creek. The rusted bushes were confined to a narrow strip along the north side of the stream.(for a distance of about ten chains) above the road crossing. This was the only spot found where an appreciable amount of intensification of the rust on ribes leaves had occurred during late summer.

A crew of seven men and a cook working from a mobile camp spent the summer scouting for the rust on portions of the Eldorado National Forest and on the extreme north end of the Stanislaus National Forest. Practically every stream within the sugar pine belt of the areas scouted was traversed and in addition the pine and ribes along many of the intermittent tributaries and ravines were examined. Infected pines were found at 21 different areas on the Eldorado National Forest, of which 8 were new discoveries. None showed an excessive amount of rust intensification. Sixteen of the 21 infection centers had only 1 to 9 infected trees. Scouting results indicate that very few new cankers have originated since the general rust wave of 1944.

Infected sugar pine were found on the Stanislaus National Forest for the first time during the summer of 1952. This probably was the most significant find of the season and extended the known pine infection 13 miles farther south into the sugar pine belt. This was a fairly heavy rust infection center for one wave of rust, as 84 diseased trees were found with a total of 343 cankers. The rust made its entry at the Moore Creek center in 1944 and all cankers appeared to be of that year's origin.

Pinyon rust on ribes was light to absent throughout the sugar pine belt except on the Eldorado National Forest. There it was found at several

spots which harbored conditions highly favorable for rust development. This same condition existed to a lesser degree on the northern end of the Stanislaus National Forest.

Scouting from the Trinity National Forest northward in the Coast Range and from the Plumas National Forest northward in the Sierra Nevada-Cascade Range showed numerous cankers of 1948 and 1949 origin on sugar and western white pine in small areas which supported conditions highly favorable to rust development. A few cankers of 1950 origin were becoming visible at some of these same areas. The presence of these cankers indicates that conditions necessary for rust build-up on pine were present at these spots during the past three seasons.

The following tabulation shows the southward spread of rust in California by years.

ANNUAL KNOWN LIMITS OF SOUTHWARD SPREAD OF  
BLISTER RUST IN CALIFORNIA BY YEARS

Year	Spread in Miles from Oregon Border			
	by Area by Host			
	Sierra Nevada		Coast Range	
	Sugar Pine	Ribes	Sugar Pine	Ribes
1936	-	-	4	6
1937	-	120	4	125
1938	-	160	4	125
1939	-	160	14	125
1940	107	160	42	125
1941	165	160	42	200
1942	165	175	42	210
1943	165	175	115	265
1944	165	240	115	265
1945	165	240	115	265
1946	204	240	121	265
1947	212	240	121	310
1948	212	240	121	310
1949	224	240	121	310
1950	231	240	121	310
1951	244	244	121	310

A small disease survey camp was established on the Rogue River National Forest during mid June. From this camp two men were engaged on pine appraisal, two men conducted disease survey work in conjunction with the pine appraisal work, and seven men took information on an extensive plot. In addition three men in the small checking camp working on the Klamath and Shasta National Forests were trained to take disease survey data. These men worked in conjunction with the checkers.

The men working with the pine appraisers and checkers took **infection** data on plots spaced at regular intervals along a predesignated compass course. From 8 to 16 lines of plots were taken in each section of area.

The disease survey crew established a one-acre plot and took complete disease data on it. Surrounding the one-acre plot an area of 189 acres forming a 20-chain protective zone was surveyed and covered thoroughly in an effort to eliminate every ribes present. Only 13 ribes were found on the 189 acres and these were scattered along a narrow belt bordering an abandoned water ditch.

All of the pine infection data taken, both on strip and in connection with the plot, were recorded in such manner that they can be coded and transferred to cards for summarization on an International Business Machine. The information obtained from the summarization of these data will be presented in a later report.

### Local Control

The local control concept (See "Changes in Control Practice," BRC Annual Report, 1949, pp. 5-7) has been applied successfully in the Pacific Coast Project since 1949. The revision of control unit boundaries is now 80 per cent complete, and it is expected that the final control unit acreage will fall between 1,000,000 and 900,000 acres. This represents a reduction of about 50 per cent. The new units, however, will contain about 86 per cent of the former sugar pine value.

The following trends may be noted in connection with the application of the local control policy:

1. The northern control units will be less affected than the southern. This may be accounted for by the actual widespread incidence of rust, the extensive areas of high hazard, and the presence of the highly susceptible species Ribes sanguineum and R. bracteosum in the northern units.
2. Worked-area costs do not seem appreciably higher, and control costs based on amount of pine protected are lower.
3. Administrative problems are increased, and seasonal personnel with a broader technical background are necessary for work lot delineation.
4. It is proving desirable to establish semi-permanent markers on control unit boundaries
5. In the northern Area II operations it is possible to eliminate many difficult and costly stream bottom areas where the sugar pine tends to occur higher on the ridges.

### Control Standards

Control standards remained unchanged throughout 1951 except on the Rogue River operation where it was found necessary, in some instances, to supplement Standard 1-A, which requires that no bush larger than four feet of live stem and no more than eight feet of live stem per acre be left, with a more rigid standard which sets the limits at two and four feet of live stem respectively.

This change was necessitated by the presence of new infections in areas meeting Standard 1-A. The occurrence of extensive areas of high hazard on which the highly susceptible Ribes sanguineum is found may account, in part, for the failure of Standard 1-A to effect actual control of the rust on some localized areas.

It is felt that this may indicate a trend toward generally more exacting standards in some parts of Area I. The bid prices of contractors where the new standard was specified were not appreciably higher.

### White Pine Appraisal

The reevaluation of commercial sugar pine stands within the project is now approximately 80 per cent complete. During 1951, 76,200 acres were appraised by the Bureau. A breakdown by operation for the season follows:

<u>Operation</u>	<u>Acres Surveyed</u>	<u>Total Man Days</u>	<u>Total Cost</u>	<u>Average Cost Per Acre</u>
Shasta	2,700	27	\$ 415	\$0.15
Lassen	24,700	207	3,560	0.14
Plumas	26,200	264	2,750	0.10
Eldorado	11,000	47	650	0.06
Stanislaus	6,100	23	305	0.05
Sierra	5,500	18	545	0.10
Totals	76,200	586	\$8,225	\$0.11

No major changes were made in the strip techniques or appraisal practices as outlined in the 1950 annual report, other than to place greater emphasis upon the collection of data on potential crop trees.

During the 1951 field season the Bureau conducted three pine appraisal schools for personnel of the Forest Service, the California Division of Forestry, and private industry, as well as for its own staff members. The objective of the schools was the standardization of criteria by which sugar pine crop trees are selected, and the interpretation and field application of these criteria.

A group representing the Forest Service, Region 5, the BPI Office of Forest Pathology, and the Bureau first selected approximately 150 sugar pine trees each of which illustrated some phase of pine appraisal strip work. After a demonstration period in which about 50 of the examples were explained, those attending the schools examined and rated the remaining trees. Their results were then compared with those of the selection group. In all about 50 men attended the classes.

The economic study of Dr. Henry J. Vaux of the University of California is nearing completion. The final draft is in preparation and should be ready for informal use by late spring. A report of the study will be published in the near future.



TABLE 1

FISCAL YEAR ALLOTMENTS FROM WHICH EXPENDITURES WERE MADE IN THE  
PACIFIC COAST PROJECT DURING THE CALENDAR YEAR 1951

## Federal Funds

<u>Agency</u>	<u>Fiscal Year 1951</u>	<u>Fiscal Year 1952</u>
Bureau of Entomology and Plant Quarantine	\$ 238,000	\$ 212,000
Forest Service Region 5 (California )	435,000	425,000
Forest Service Region 6 (Oregon)	51,200	60,000
National Park Service:		
Yosemite National Park	180,900	139,339
Sequoia-Kings Canyon National Parks	107,855	130,194
Regional Office	24,095	25,000
Bureau of Land Management	<u>60,000</u>	<u>44,000</u>
Total Federal Funds	\$ 1,097,050	\$ 1,035,533*

## Cooperative Funds

State of California	\$ 168,437	\$ 168,437
Michigan-California Lumber Company	2,000	2,000
Stockton Box Company	<u>200</u>	<u>200</u>
Total Cooperative Funds	\$ 170,637	\$ 170,637*
Total All Funds	\$ 1,267,687	\$ 1,206,170

\* Figures in this column represent allotments as they are known as of December 31, 1951 and are subject to change until June 30, 1952.

TABLE 2

## EXPENDITURES IN THE PACIFIC COAST PROJECT FOR THE CALENDAR YEAR 1951

## Federal Funds

	California		Oregon		Region Total
	Fiscal Year 1951 1/1/51-6/30/51	Fiscal Year 1952 7/1/51-12/31/51	Fiscal Year 1951 1/1/51-6/30/51	Fiscal Year 1952 7/1/51-12/31/51	
Bureau of Entomology and Plant Quarantine	\$113,869	\$ 81,269	\$ 8,050	\$ 8,835	\$ 212,023
Forest Service Region 5	195,752	166,671	-	-	362,423
Forest Service Region 6	-	-	14,710	31,305	46,015
National Park Service:					
Yosemite National Park	30,887	92,614	-	-	123,501
Sequoia-Kings Canyon					
National Parks	35,879	81,049	-	-	116,928
Regional Office	12,616	12,012	-	-	24,628
Bureau of Land Management	-	-	26,630	23,950	50,630
Total Federal Funds	\$389,003	\$433,615	\$49,440	\$64,090	\$936,148
Cooperative Funds					
State of California	\$ 39,459	\$115,350	-	-	\$ 154,809
Michigan-California Lumber Company	-	2,000	-	-	2,000
Stockton Box Company	-	200	-	-	200
Total Cooperative Funds	\$ 39,459	\$117,550	-	-	\$ 157,009
Total All Funds	\$428,462	\$551,165	\$49,440	\$64,090	\$1,093,157

TABLE 3

STATEMENT OF ALLOTMENTS BY FISCAL YEARS FOR RIBES ERADICATION  
ON STATE AND PRIVATE LANDS

Fiscal Years	State of California Contributions			Private Cash Contri- butions	Total State and Private	BEPQ Allotments				Total State Private and Bureau
	Cash	Other	Total			3101.14				
						71.14 W-a.14 and W-e.14	3103.14 73.14 W-e.14 and W-o.14	Total BEPQ		
1942	\$ 25,000	-	\$ 25,000	-	\$ 25,000	\$ 61,370	\$ 14,625	\$ 75,995	\$ 100,995	
1943	25,000	-	25,000	6,000	31,000	71,000	71,770	142,770	173,770	
1944	50,000	-	50,000	6,000	56,000	82,825	86,195	169,020	225,020	
1945	50,000	-	50,000	4,000	54,000	83,216	85,040	168,256	222,256	
1946	75,000	20,410	95,410	5,000	100,410	95,250	271,125	366,375	466,785	
1947	75,000	74,860	149,860	5,000	154,860	137,022	563,000	700,022	854,882	
1948	125,000	48,142	173,142	5,000	178,142	126,000	130,000	256,000	434,142	
1949	153,125	43,044	196,169	5,000	201,169	136,459	115,440	251,899	453,068	
1950	168,437	35,994	204,431	4,000	208,431	134,959	105,000	239,959	448,390	
1951	168,437	26,237	194,674	2,200	196,874	137,000	100,000	237,000	433,874	
1952	168,437	16,351	184,788	2,200	186,988	109,000	103,000	212,000	398,988	
Totals Accumulative	1,083,436	265,038	1,348,474	44,400	1,392,874	1,174,101	1,845,195	2,819,296	4,212,170	
Expenditures 7/1/41 to 12/31/51	\$1,002,829	\$265,038	\$1,267,867	\$44,400	\$1,312,267	\$1,122,928	\$1,573,703	\$2,696,631	\$4,008,898	



REGIONAL SUMMARY TABLES

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TABLE 1

THE STATUS OF RIBES ERADICATION IN THE PACIFIC COAST PROJECT AS OF DECEMBER 31, 1951

## PART A - CALIFORNIA

Control Operation	Class of Ownership	Control Units		Status of Ribes Eradication							
		Total Acres	Acres Unworked	Net Acres by Workings				Total Man Days	Thousands of Ribes Destroyed	Acres on Maintenance	
				First	Second	Other	Total				
National Forests											
Mendocino	Federal	5,720	5,720								
	Private	4,080	4,080								
	Totals	12,800	12,800								
Trinity	Federal	51,380	51,380								
	Private	17,020	17,020								
	State	320	320								
Klamath	Federal	3,956	3,956	3,956	3,353	1,073	8,382	7,243	430	117	
	Private	7,372	7,372	6,728	2,838		16,935	13,521	675		
	State	45	45	45			90	25	1	447	
Shasta	Federal	11,372	11,372	11,372	10,124	3,911	25,407	20,799	1,107	454	
	Private	3,440	1,993	1,447	380		1,827	446	22		
	Totals	25,400	25,400								
Lassen	Federal	28,840	27,393	1,447	380		1,827	446	22		
	Private	42,040	21,743	20,297	8,143	4,410	32,850	16,946	2,906	3,850	
	State	211,093	115,230	95,863	34,131	30,637	160,631	80,978	10,903		
Plumas	Federal	253,715	137,468	116,247	42,314	35,067	193,628	98,026	13,829	25,105	
	Private	139,359	45,334	94,025	45,927	33,785	173,737	109,323	18,062	22,902	
	State	72,616	19,279	53,337	24,557	20,157	98,051	69,938	10,705		
Tahoe	Federal	212,335	94,898	147,437	70,524	53,942	271,903	179,357	28,789	33,162	
	Private	16,480	12,397	4,083			4,083	1,764	549		
	State	2,520	2,520								
Eldorado	Federal	107,054	27,312	79,742	35,762	12,895	128,399	77,434	14,596	10,517	
	Private	110,136	18,364	91,772	49,560	22,209	163,541	100,511	19,206		
	State	2,292	2,292	1,165	1,141	4,598	2,375	420	9,623		
Stanislaus	Federal	219,482	45,676	173,806	86,487	36,245	296,538	180,320	34,622	20,140	
	Private	104,370	8,547	95,823	59,260	48,061	203,144	100,154	23,922	17,858	
	State	95,431	5,432	89,999	45,304	29,604	164,907	79,146	18,408	5,458	
Sierra	Federal	199,801	13,979	185,822	104,564	77,665	368,051	179,300	42,330	23,325	
	Private	132,431	72,552	59,879	27,846	29,115	116,840	151,653	37,496		
	State	43,602	26,268	17,334	6,830	5,867	30,031	33,851	7,947		
Sequoia	Federal	176,033	98,820	77,213	34,676	34,982	146,871	185,504	45,443		
	Private	14,450	14,450								
	State	17,150	17,150								
TOTAL ALL NATIONAL FORESTS	Federal	623,680	264,428	359,252	180,671	129,339	669,262	464,963	98,383	55,254	
	Private	606,419	290,743	355,676	167,108	111,312	634,096	377,955	67,845		
	State	6,939	4,500	2,439	1,290	1,161	4,950	2,558	463	46,943	
National Parks											
Lassen Volcanic	Federal	17,779		17,779	17,565	5,389	40,733	7,991	986	15,186	
Yosemite	Federal	101,506	33,739	67,767	50,858	32,730	151,355	177,210	22,144	50,222	
Sequoia-Kings Canyon	Federal	53,367	22,266	31,101	19,044	13,501	64,246	57,130	8,393	13,707	
TOTAL ALL NATIONAL PARKS	Federal	172,652	56,005	116,647	88,067	51,620	256,334	242,331	31,523	79,115	
State Forests and Parks											
Latour Forest	Private	1,344		1,344			1,344	306	15		
Calaveras Big Trees Park	State	1,804	380	1,514			1,514	575	25		
	Totals	3,238	380	2,858			2,858	881	40	1,460	
	Private	120		120	75	120	315	62	6		
TOTAL ALL STATE FORESTS AND PARKS	State	1,820	72	1,748	1,110	1,569	4,517	1,880	215		
	Totals	1,940	72	1,868	1,185	1,779	4,832	1,942	224	1,359	
	Private	1,464		1,464	75	120	1,659	370	23		
TOTAL ALL STATE FORESTS AND PARKS	State	3,714	452	3,262	1,110	1,659	6,031	2,456	241		
	Totals	5,178	452	4,726	1,185	1,779	7,690	2,826	264	2,619	
	Totals for California										
TOTAL ALL CONTROL OPERATIONS CALIFORNIA	National Forest	623,680	264,428	359,252	180,671	129,339	669,262	464,963	98,383	55,254	
	National Park	172,652	56,005	116,647	88,067	51,620	256,334	242,331	31,523	79,115	
	Totals	796,332	320,433	475,899	268,738	180,959	925,596	707,294	129,906	134,369	
	Private	607,863	290,743	357,140	167,183	111,432	635,753	378,325	67,868		
	State	10,713	4,952	5,761	2,400	2,820	10,981	5,054	704	49,762	
TOTAL ALL STATE FORESTS AND PARKS	Private	1,464		1,464	75	120	1,659	370	23		
	State	3,714	452	3,262	1,110	1,659	6,031	2,456	241		
	Totals	5,178	452	4,726	1,185	1,779	7,690	2,826	264	2,619	





TABLE 1 (Continued)

THE STATUS OF RIBES ERADICATION IN THE PACIFIC COAST PROJECT AS OF DECEMBER 31, 1951

## PART B - OREGON

Control Operation	Class of Ownership	Control Units		Status of Ribes Eradication							
		Total Acres	Acres Unworked	Net Acres by Workings				Total Man Days	Thousands of Ribes Destroyed	Acres on Maintenance	
				First	Second	Other	Total				
National Forests											
Rogue River	Federal	64,293	4,689	59,604	35,552	29,441	124,597	54,842	14,177	10,378	
	Private	2,889	244	2,645	1,666	2,153	6,464	1,803	210	614	
	Totals	67,182	4,933	62,249	37,218	31,594	131,061	56,645	14,387	10,992	
Klamath	Federal	1,615		1,615	1,615		3,230	3,413	24		
	Private	592		592		130	1,314	1,364	63		
	Totals	2,207		2,207	2,207	130	4,544	4,777	277		
TOTAL ALL NATIONAL FORESTS	Federal	65,908	4,689	61,219	37,167	29,441	127,827	58,255	14,391	10,378	
	Private	3,481	244	3,237	2,258	2,283	7,778	3,167	273	614	
	Totals	69,389	4,933	64,456	39,425	31,724	135,605	61,422	14,664	10,992	
National Parks											
Crater Lake	Federal	3,782	150	3,632	1,145	416	5,193	527	150	3,371	
Bureau of Land Management											
Medford	Mat. For.	27,284	5,276	22,008	11,485		33,493	6,409	293	9,845	
	BLM	51,579	6,947	44,632	27,532	1,609	73,773	15,651	752	19,286	
	Totals	78,863	12,223	66,640	39,017	1,609	107,266	22,060	1,045	29,131	
	Private	15,392	1,522	13,870	3,984		17,854	6,955	393		
	State	637		637			637	92	2	3,627	
Totals	94,892	13,745	81,147	43,001	1,609	125,757	29,117	1,440	32,758		
Totals for Oregon											
TOTAL ALL CONTROL OPERATIONS OREGON	Mat. For.	93,192	9,965	83,227	48,652	29,441	161,320	64,664	14,664	20,223	
	Mat. Park	3,782	150	3,632	1,145	416	5,193	527	150	3,371	
	BLM	51,579	6,947	44,632	27,532	1,609	73,773	15,651	752	19,286	
	Totals	148,553	17,062	131,491	77,329	31,466	240,286	80,842	15,586	42,880	
	Private	18,873	1,766	17,107	6,242	2,283	25,632	10,132	666		
	State	637		637			637	92	2	4,241	
Totals	168,063	18,828	149,235	83,571	33,749	266,555	91,066	16,254	47,121		
PART C - TOTALS FOR THE PACIFIC COAST PROJECT											
CALIFORNIA AND OREGON	Mat. For.	716,872	274,393	442,479	229,323	158,780	830,582	529,627	113,067	75,477	
	Mat. Park	176,434	56,155	120,279	89,212	52,036	261,527	242,858	31,673	82,486	
	BLM	51,579	6,947	44,632	27,532	1,609	73,773	15,651	752	19,286	
	Totals	944,885	337,495	607,390	346,067	212,425	1,165,882	788,136	145,492	177,249	
	Private	626,756	252,509	374,247	173,425	113,715	661,387	388,457	68,534		
	State	11,350	4,952	6,398	2,400	2,820	11,618	5,146	706	54,003	
Totals	1,582,991	594,956	968,035	521,892	328,960	1,836,887	1,181,739	214,732	231,252		



TABLE 2

## SUMMARY OF RIBES ERADICATION IN THE PACIFIC COAST PROJECT - 1951

Control Operation	Class of Work	Acres	Man Days	Thousands of Ribes Destroyed
California				
Shasta National Forest	Initial	1,067	394	22
	Reeradication	380	52	
	Totals	1,447	446	22
Lassen National Forest	Initial	1,810	531	43
	Reeradication	9,299	1,478	109
	Totals	11,109	2,009	152
Plumas National Forest	Initial	2,438	2,481	426
	Reeradication	4,609	1,450	263
	Totals	7,047	3,931	689
Tahoe National Forest	Initial	2,951	1,435	491
	Reeradication	2,227	961	236
	Totals	5,178	2,396	727
Eldorado National Forest	Initial	2,227	961	236
	Reeradication	3,244	2,091	382
	Totals	5,471	3,052	618
Stanislaus National Forest	Initial	1,373	1,235	608
	Reeradication	3,528	1,084	302
	Totals	4,901	2,319	910
Sierra National Forest	Initial	2,677	5,316	2,291
	Reeradication	1,749	1,267	390
	Totals	4,426	6,583	2,681
NATIONAL FOREST TOTALS	Initial	14,543	12,353	4,117
	Reeradication	22,809	7,422	1,446
	Totals	37,352	19,775	5,563
Yosemite National Park	Initial	878	1,857	842
	Reeradication	15,862	3,893	295
	Totals	16,740	5,750	1,137
Sequoia-Kings Canyon National Parks	Initial	2,314	3,428	648
	Reeradication	11,063	2,554	119
	Totals	13,377	5,982	767
NATIONAL PARK TOTALS	Initial	3,192	5,285	1,490
	Reeradication	26,925	6,447	414
	Totals	30,117	11,732	1,904
Latour State Forest	Initial	70	41	4
	Reeradication	1,624	111	8
Calaveras Big Trees State Park	Initial	70	41	4
	Reeradication	1,624	111	8
STATE FOREST AND STATE PARK TOTALS	Initial	1,694	152	12
	Reeradication	17,805	17,679	5,611
	Totals	19,499	17,831	5,623
Oregon				
Rogue River National Forest	Initial	1,420	219	17
	Reeradication	5,037	1,228	88
	Totals	6,457	1,447	105
Klamath National Forest	Initial	130	87	
	Reeradication	1,420	219	17
	Totals	1,550	306	17
NATIONAL FOREST TOTALS	Initial	5,167	1,315	88
	Reeradication	6,587	1,534	105
	Totals	11,754	2,849	193
Medford (Bureau Land Management)	Initial	9,011	1,704	101
	Reeradication	1,609	395	1
	Totals	10,620	2,099	102
OREGON TOTALS	Initial	10,431	1,923	118
	Reeradication	6,776	1,710	89
	Totals	17,207	3,633	207
Pacific Coast Project				
CALIFORNIA AND OREGON	Initial	28,236	19,602	5,729
	Reeradication	58,134	15,690	1,957
	Totals	86,370	35,292	7,686



TABLE 3

## SUMMARY OF RIBES ERADICATION BY AGENCY AND BY LAND OWNERSHIP IN THE PACIFIC COAST PROJECT - 1951

Work Agency	Acres		Man Days		Thousands of Ribes Destroyed	Per Worked Acre		Ownership of Acres Covered				
	Checked and Meeting Standards Without Work	Total	Eradication	Checking		Total	Eradication Man Days	Ribes Forest	Nat. Park	Federal		
										BLM	Private State	
Initial Work												
California:												
B.E.P.Q.	2,999	3,303	304	237	1,721	791	0.49	264	127		127	3,106
Forest Service	10,788	9,963	522	710	10,673	3,330	0.92	308	11,173		11,173	137
Park Service	3,017	3,192	155	38	5,285	1,490	1.73	491	3,192		3,192	
Subtotals -	16,824	17,805	981	985	17,679	5,611	0.99	333	11,300	3,192	14,492	70
Oregon:												
Forest Service	929	1,420	491	65	219	17	0.16	18	1,395		1,395	25
Bur. Land Mgmt.	3,382	9,011	5,629	196	1,704	101	0.45	30	2,298	4,821	7,119	637
Subtotals -	4,311	10,431	6,120	261	1,923	118	0.38	27	3,693	4,821	8,514	637
Totals -	21,135	28,236	7,101	1,246	19,602	5,729	0.87	271	14,993	3,192	23,006	707
Reeradication												
California:												
B.E.P.Q.	10,785	18,034	7,249	1,032	4,897	784	0.35	73	781		781	15,749
Forest Service	5,512	6,399	887	530	2,636	670	0.38	121	6,191		6,191	208
Park Service	12,045	26,925	14,860	731	6,447	414	0.47	34	26,925	26,925	26,925	
Subtotals -	28,342	51,358	23,016	2,293	13,980	1,868	0.41	66	6,972	26,925	33,897	1,504
Oregon:												
Forest Service	4,225	5,167	942	387	1,315	88	0.22	21	4,750		4,750	417
Bur. Land Mgmt.	1,609	2,602	66	329	395	1	0.04	1		1,609	1,609	
Subtotals -	5,834	6,776	942	716	1,710	89	0.17	15	4,750		6,359	417
Totals -	34,176	58,134	23,958	3,009	15,690	1,957	0.37	57	11,722	26,925	40,236	1,504
All Workings												
California:												
B.E.P.Q.	13,784	21,337	7,553	1,269	6,618	1,575	0.39	114	908		908	18,855
Forest Service	16,300	17,709	1,409	1,240	13,309	4,000	0.74	245	17,364		17,364	345
Park Service	15,082	30,117	15,035	769	11,732	1,904	0.73	126	30,117	30,117	30,117	
Subtotals -	45,166	69,163	23,997	3,278	31,659	7,479	0.63	165	18,272	30,117	48,389	1,574
Oregon:												
Forest Service	5,144	6,587	1,433	452	1,534	105	0.20	20	6,145		6,145	442
Bur. Land Mgmt.	4,991	10,620	5,629	525	2,099	102	0.31	20	2,298	6,430	8,728	1,255
Subtotals -	10,135	17,207	7,062	977	3,633	207	0.26	20	8,443	6,430	14,873	637
Totals -	55,311	86,370	31,059	4,255	35,292	7,686	0.56	138	26,715	30,117	61,262	2,211



TABLE 4

SUMMARY OF CHEMICAL SPRAY WORK IN THE  
PACIFIC COAST PROJECT - 1951

Control Operation	Agency	Acres Covered	Total Man Days	Thousands of Ribes Sprayed	Thousands of Gallons of Spray Used	Per Acre		
						Man Days	Gallons Spray	Ribes
Plumas	FS	30	57	40.	6	1.30	200	1,333
Eldorado	EQ	70	124	72	13	1.74	185	1,026
Stanislaus	FS	236	269	320	53	1.14	224	1,356
	EQ	534	480	602	63	0.90	118	1,127
Sierra	FS	306	708	1,175	90	2.31	294	3,839
Yosemite	NPS	231	598	812	113	2.59	489	3,515
Sequoia Kings Canyon	NPS	638	829	176	20	1.29	31	276
Medford	BLM	360	63	4	1	0.17	3	11
	EQ	604	604	574	76	1.00	126	1,116
Agency Totals	FS	572	1,034	1,535	149	1.81	260	2,683
	NPS	869	1,427	988	133	1.64	153	1,137
	BLM	360	63	4	1	0.17	3	11
Grand Totals		2,405	3,128	3,201	359	1.31	149	1,330



TABLE 5

CUMULATIVE SUMMARY OF CHEMICAL SPRAY WORK IN THE  
PACIFIC COAST PROJECT 1946-1951

Control Operation	Agency	Acres Covered	Total Man Days	Thousands of Ribes Sprayed	Thousands of Gallons of Spray Used	Per Acre	
						Man Days	Gallons Spray
Lassen	EQ	303	223	106	27	0.74	89
	EQ	682	1,029	1,261	182	1.51	266
Plumas	FS	30	57	40	6	1.90	200
	EQ	285	344	157	29	1.21	102
Eldorado	FS	597	341	294	56	0.57	94
	EQ	354	242	246	42	0.68	118
Stanislaus	FS	1,329	1,585	2,590	304	1.19	229
	EQ	738	788	965	107	1.07	144
Sierra	FS	1,857	3,632	5,311	476	1.95	256
Yosemite	NPS	810	2,450	2,074	393	0.30	485
Sequoia-Kings Canyon	NPS	771	965	243	32	1.25	41
Medford	BLM	481	103	23	2	0.21	4
	EQ	2,362	2,626	2,735	387	1.11	164
Agency Totals	FS	3,813	5,615	8,235	842	1.47	220
	NPS	1,581	3,416	2,317	425	2.16	268
	BLM	481	103	23	2	0.21	4
Grand Totals		8,237	11,760	13,310	1,656	1.40	201
							1,616



TABLE 6

## SUMMARY OF RIBES ERADICATION BY CONTRACT - 1951

Control Operation	Agency	Acres Worked By	Erad. Man Days	Thousands of Ribes	Per Worked Acre		Ave. Price	Contract Cost (Dollars)
		Contractors		Destroyed	Man Days	Ribes	Per Acre Paid To Contractor	
Initial								
California Shasta	FS	1,067	236	22	0.22	21	\$ 4.99	5,330
	EQ	1,145	340	36	0.29	31	6.18	7,072
Lassen	FS	277	32	7	0.12	25	2.60	720
	EQ	457	187	44	0.41	96	8.26	3,775
Plumas	FS	859	416	141	0.48	161	9.77	8,394
Tahoe	FS	2,391	935	491	0.39	205	6.70	16,023
	EQ	241	54	15	0.22	62	6.00	1,448
Eldorado	FS	1,986	841	221	0.42	111	7.56	15,023
	EQ	439	280	57	0.64	130	7.41	3,252
Stanislaus	FS	631	575	224	0.91	354	13.00	8,216
Sierra	EQ	36	50	21	1.39	583	8.00	288
Oregon Rogue River	FS	845	124	14	0.15	17	2.97	2,508
Medford	BLM	2,774	1,192	87	0.43	31	7.31	20,280
Totals		13,148	5,262	1,380	0.40	105	7.02	92,329
Reeradication								
California								
	EQ	3,145	698	98	0.22	31	6.13	19,281
Lassen	FS	567	104	10	0.18	18	3.46	1,963
	EQ	2,244	558	126	0.25	56	5.90	13,248
Plumas	FS	1,626	379	115	0.23	71	5.66	9,205
	EQ	310	65	22	0.21	71	7.82	2,424
Eldorado	FS	639	200	62	0.31	97	5.33	3,404
	EQ	1,775	537	193	0.30	109	4.76	8,459
Stanislaus	FS	385	203	92	0.53	239	4.43	1,705
Sierra	FS	1,111	584	111	0.52	100	6.23	6,923
Yosemite	NPS	1,397	383	25	0.27	18	5.02	7,020
Sequoia-K.C.	NPS	287	230	32	0.80	111	13.67	3,925
Oregon Rogue River	FS	3,636	660	36	0.18	10	3.88	14,122
Klamath	FS	53	5	-	0.09	-	4.98	264
Totals		17,175	4,606	922	0.27	54	5.35	91,943

See next page for continuation of this table.

TABLE 6 (CONTINUED)

## SUMMARY OF RIBES ERADICATION BY CONTRACT - 1951

Control Operation	Agency	Acres Worked By	Erad.	Thousands of	Per Worked Acre		Ave. Price	Contract Cost (Dollars)
		Contractors	Man Days	Ribes Destroyed	Man	Ribes	Per Acre Paid To Contractor	
All Workings								
California								
Shasta	FS	1,067	236	22	0.22	21	\$ 4.99	5,330
	EQ	4,290	1,038	134	0.24	31	6.14	26,353
Lassen	FS	844	136	17	0.16	20	3.18	2,683
	EQ	2,701	745	170	0.27	63	6.30	17,023
Plumas	FS	2,485	795	256	0.32	103	7.08	17,599
Tahoe	FS	2,391	935	491	0.39	205	6.70	16,023
	EQ	551	119	37	0.22	67	7.03	3,872
Eldorado	FS	2,625	1,041	283	0.40	108	7.02	18,427
	EQ	2,214	817	250	0.37	113	5.29	11,711
Stanislaus	FS	1,016	778	316	0.76	312	9.76	9,921
	EQ	36	50	21	1.39	583	8.00	288
Sierra	FS	1,111	584	111	0.52	100	6.23	6,923
Yosemite	NPS	1,397	383	25	0.27	18	5.02	7,020
Sequoia-K.C.	NPS	287	230	32	0.80	111	13.67	3,925
Oregon								
Rogue River	FS	4,461	784	50	0.17	11	3.71	16,630
Klamath	FS	53	5	-	0.09	-	4.98	264
Medford	BLM	2,774	1,192	87	0.43	31	7.31	20,280
Totals		30,323	9,868	2,302	0.32	76	6.08	184,272

TABLE 7

CUMULATIVE SUMMARY OF RIBES ERADICATION BY CONTRACT 1946-1951

Control Operation	Agency	Acres Worked By Contractor	Eradication Man Days	Thousands of Ribes Destroyed	Per Worked Acre		Ave. Price Per Acre Paid to Contractor	Contract Cost (Dollars)
					Man Days	Ribes		
Initial Work								
California:	EQ	145	70	6	0.48	41	\$ 7.50	\$ 1,087
Klamath	FS	469	97	17	0.21	36	4.82	2,262
Shasta	FS	1,067	236	22	0.22	21	4.99	5,330
	EQ	2,887	917	182	0.32	63	5.89	17,002
Lassen	FS	277	32	7	0.12	25	2.60	720
	EQ	1,618	561	135	0.35	83	6.97	11,273
Plumas	FS	1,314	1,187	224	0.90	170	8.86	11,648
Tahoe	FS	3,523	1,233	549	0.35	156	6.59	23,216
	EQ	241	54	15	0.22	62	6.00	1,448
Kidorado	FS	4,689	1,769	560	0.38	119	5.71	26,788
	EQ	1,108	606	171	0.55	154	6.34	7,022
Stanislaus	FS	1,236	1,023	375	0.83	303	9.73	12,028
Sierra	EQ	166	86	35	0.52	211	6.51	1,080
Lassen Volcanic	NPS	197	17	11	0.09	57	2.13	420
Oregon:								
Umpqua	FS	1,618	480	20	0.30	12	4.19	6,784
Bogue River	FS	2,356	379	56	0.16	24	2.93	6,913
Klamath	FS	640	782	41	1.22	64	5.30	3,392
Medford	NLM	5,528	2,291	133	0.41	24	6.47	35,756
Totals		29,079	11,820	2,559	0.41	88	5.99	174,169
Reeradication								
	EQ	970	223	14	0.23	14	3.68	3,567
Klamath	FS	284	52	2	0.18	7	6.75	1,917
	EQ	7,547	1,969	320	0.26	42	5.89	44,479
Lassen	FS	567	104	10	0.18	18	3.46	1,963
	EQ	2,863	732	151	0.26	53	5.92	16,948
Plumas	FS	8,612	3,479	371	0.40	43	5.79	49,939
	EQ	2,104	749	164	0.36	78	5.99	12,603
Kidorado	FS	3,351	1,142	253	0.34	75	4.45	14,924
	EQ	7,126	1,694	517	0.24	73	3.87	27,591
Stanislaus	FS	5,400	1,623	393	0.30	73	4.58	24,728
	EQ	780	368	19	0.47	24	5.29	4,126
Sierra	FS	4,557	3,311	311	0.73	68	5.35	24,395
Lassen Volcanic	NPS	2,118	404	74	0.19	35	4.85	10,263
Yosemite	NPS	1,397	383	25	0.27	18	5.02	7,020
Sequoia-Kings	NPS	287	230	32	0.80	111	13.67	3,925
Bogue River	FS	25,237	5,757	531	0.23	21	4.17	105,216
Siaticron	FS	431	176	4	0.41	9	10.32	4,450
Klamath	FS	1,284	397	17	0.31	13	4.95	6,263
Medford	NLM	2,313	899	21	0.39	9	6.45	14,916
Crater Lake	NPS	261	29	6	0.11	23	1.10	287
Totals		77,469	23,721	3,235	0.31	42	4.90	379,520
All Workings								
California:	EQ	1,115	293	20	0.26	18	4.17	4,654
Klamath	FS	753	149	19	0.20	25	5.55	4,179
Shasta	FS	1,067	236	22	0.22	21	4.99	5,330
	EQ	10,434	2,886	502	0.28	48	5.89	61,481
Lassen	FS	444	136	17	0.16	20	3.18	2,583
	EQ	4,481	1,293	286	0.29	64	6.30	28,221
Plumas	FS	9,926	4,666	595	0.47	60	6.20	61,587
Tahoe	FS	3,523	1,233	549	0.35	156	6.59	23,216
	EQ	2,245	803	179	0.34	76	5.99	14,051
Kidorado	FS	8,040	2,911	813	0.35	101	5.19	41,712
	EQ	8,234	2,300	688	0.28	84	4.20	34,613
Stanislaus	FS	6,636	2,646	768	0.40	116	5.54	36,756
	EQ	946	454	54	0.48	57	5.50	5,206
Sierra	FS	4,557	3,311	311	0.73	68	5.35	24,395
Lassen Volcanic	NPS	2,315	421	85	0.18	37	4.61	10,683
Yosemite	NPS	1,397	383	25	0.27	18	5.02	7,020
Sequoia-Kings	NPS	287	230	32	0.80	111	13.67	3,925
Oregon:								
Umpqua	FS	1,618	480	20	0.30	12	4.19	6,784
Bogue River	FS	27,593	6,136	587	0.22	21	4.06	112,129
Siaticron	FS	431	176	4	0.41	9	10.32	4,450
Klamath	FS	1,304	1,179	58	0.62	30	5.07	3,655
Medford	NLM	7,841	3,190	154	0.41	20	6.46	50,672
Crater Lake	NPS	261	29	6	0.11	23	1.10	287
Totals		106,548	35,541	5,794	0.33	54	\$ 5.20	\$ 553,689



TABLE 6

## SUMMARY OF RIBES RADICATION BY LAND OWNERSHIP AND NUMBER OF WORKING IN THE PACIFIC COAST PROJECT - 1951

Land Ownership	Status of Ribes Eradication										Totals All Workings		
	First Working			Second Working			Other Workings						
	Acres	Man Days	Thousands of Ribes Destroyed	Acres	Man Days	Thousands of Ribes Destroyed	Acres	Man Days	Thousands of Ribes Destroyed	Acres	Man Days	Thousands of Ribes Destroyed	
California													
National Forest	11,300	10,653	3,359	2,944	1,644	555	4,028	1,155	153	16,272	13,152	4,067	
National Park	3,192	5,285	1,490	5,929	2,758	240	20,996	3,689	174	30,117	11,732	1,904	
Private	3,243	1,700	758	5,672	1,424	198	10,285	3,220	544	19,200	6,344	1,500	
State	70	41	4				1,504	90	4	1,574	131	8	
Totals - - - - -	17,805	17,679	5,611	14,545	5,826	993	36,813	8,154	875	69,163	31,659	7,479	
Oregon													
National Forest	3,693	668	39	866	415	66	3,884	768	19	8,443	1,851	124	
Bur. Land Mgmt.	4,821	960	68				1,509	395	1	6,430	1,355	69	
Private	1,280	255	10	29	4	1	388	128	2	1,697	387	13	
State	637	40	1							637	40	1	
Totals - - - - -	10,431	1,923	118	895	419	67	5,881	1,291	22	17,207	3,633	207	
Pacific Coast Project													
National Forest	14,993	11,321	3,398	3,810	2,059	621	7,912	1,923	172	26,715	15,303	4,191	
National Park	3,192	5,285	1,490	5,929	2,758	240	20,996	3,689	174	30,117	11,732	1,904	
Bur. Land Mgmt.	4,821	960	68				1,509	395	1	6,430	1,355	69	
Private	4,523	1,955	768	5,701	1,428	199	10,673	3,348	546	20,897	6,731	1,513	
State	707	81	5				1,504	90	4	2,211	171	9	
Totals - - - - -	28,236	19,602	5,729	15,440	6,245	1,060	42,694	9,445	897	86,370	35,292	7,686	

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TABLE 9  
CHECKING COSTS - 1951

Operation	Agency	Costs			(4)	Average Cost Per Man Day
		(1) Gross Checking Salaries	(2) Costs Other Than Checking	(3) Total Checking Costs	Total Paid Checking Man Days	
Oregon						
Rogue	FS	\$ 5,133.50	\$ 342.67	\$ 5,476.17	370	\$14.80
Siskiyou	BLM	6,655.00	2,740.00	9,395.00	525	17.90
Klamath	FS	886.60	351.56	1,238.16	82	15.09
Totals		12,675.10	3,434.23	16,109.33	977	16.49
California						
Klamath	FS	750.40	301.33	1,051.73	70	15.02
	EQ	631.79	251.10	882.89	59	14.96
Shasta	FS	1,454.22	585.93	2,040.15	134	15.23
	EQ	473.63	184.14	657.77	44	14.95
Lassen	FS	842.68	238.00	1,080.68	70	15.44
	EQ	6,454.04	1,904.64	8,358.68	559	14.95
Plumas	FS	3,070.29	932.82	4,003.11	214	18.71
	EQ	2,997.34	1,032.07	4,029.41	217	18.53
Tahoe	FS	1,749.51	443.12	2,192.63	134	16.30
	FS	882.32	1,254.46	2,136.78	76	28.11
Eldorado	EQ	1,370.34	1,672.30	3,042.64	104	29.26
	FS	2,258.90	849.29	3,108.19	176	17.66
Stanislaus	EQ	2,922.63	1,101.19	4,023.82	213	18.89
	FS	4,049.14	839.85	4,888.99	309	15.82
Sierra	NPS	5,564.42	795.77	6,360.19	418	15.21
Sequoia-Kings Canyon	NPS	4,477.00	225.00	4,702.00	340	13.85
Totals		39,948.65	12,611.01	52,559.66	3,137	16.75
Pacific Coast Project						
Totals-All Agencies		\$52,623.75	\$16,045.24	\$68,668.99	4,114	\$16.69

(1) Includes all salaries paid to checkers.

(2) Includes: A. Mileage cost at  $7\frac{1}{2}$ ¢ per mile for pickup; 19¢ per mile for stakeside. Does not include mileage of permanent personnel.

B. Cooks salary chargeable to checking. Does not include man days or estimated cost of same worked by permanent personnel on checking activity.

(3) Total of (1) and (2).

(4) Includes man days pertaining to checking only.

TABLE 10

## SUMMARY OF CHECKING IN THE PACIFIC COAST PROJECT - 1951

Operation	Agency	Acres			Total All Checks							Cost		
		First Regular Check	All Re-checks	Advance Check	Post Check	Acres Covered	Strip Acres	Per Cent of Check	Worked Man Days	Cost Per Acre	Strip Acres	Per Strip Acre	M.D.	
Oregon														
Rogue	FS	4,736	3,081	-	5,836	13,653	1,099.2	8.1	370	\$4.40	84.98	2.97		
Siskiyou	BLM	3,200	1,228	4,352	12,060	20,840	1,215.5	5.8	525	.45	7.73	2.32		
Klamath	FS	52	20	-	1,990	2,062	95.0	4.6	82	.60	13.03	1.16		
Totals		7,988	4,329	4,352	19,886	36,555	2,409.7	6.6	977	.44	6.69	2.47		
California														
Klamath	FS	-	-	-	1,828	1,828	82.0	4.5	70	.57	12.82	1.17		
	EQ	-	-	-	1,604	1,604	73.0	4.6	59	.55	12.09	1.24		
Shasta	FS	777	405	2,910	-	4,092	197.0	4.8	134	.50	10.35	1.47		
	EQ	246	127	919	-	1,292	62.2	4.8	44	.51	10.58	1.41		
Lassen	FS	949	1,279	760	-	2,988	146.0	4.9	70	.36	7.40	2.08		
	EQ	4,896	3,011	2,418	4,685	15,010	724.6	4.8	559	.56	11.53	1.30		
Plumas	FS	2,930	1,722	1,175	2,690	8,517	357.4	4.2	217	.47	11.20	1.64		
	EQ	3,946	996	223	4,623	9,788	397.9	4.1	214	.41	10.13	1.86		
Tahoe	FS	2,808	1,236	2,119	-	6,163	260.8	4.2	134	.36	8.41	1.94		
	FS	2,461	389	2,288	1,283	6,421	240.6	3.7	76	.33	8.88	3.17		
Eldorado	EQ	1,279	90	510	6,704	8,583	349.5	4.1	104	.35	8.71	3.36		
	FS	829	1,030	959	6,151	8,969	390.3	4.4	176	.35	7.96	2.22		
Stanislaus	EQ	2,600	1,037	1,085	7,904	12,626	482.1	3.8	213	.32	8.35	2.26		
Sierra	FS	1,929	681	2,895	7,586	13,091	651.0	5.0	309	.37	7.51	2.10		
Yosemite	NFS	5,224	722	-	12,532	18,478	924.0	5.0	418	.34	6.88	2.21		
Sequoia-Kings Canyon	NPS	5,770	540	520	6,430	13,260	698.0	5.3	340	.35	6.74	2.05		
Totals		36,644	13,265	18,781	64,020	132,710	6,036.4	4.5	3,137	.40	8.71	1.92		
Pacific Coast Project														
Totals-All Agencies		44,632	17,594	23,133	83,906	169,265	8,446.1	5.0	4,114	.41	8.13	2.05		



MAPS OF ACTIVE CONTROL OPERATIONS SHOWING

THE STATUS OF BLISTER RUST CONTROL

AS OF DECEMBER 31, 1951

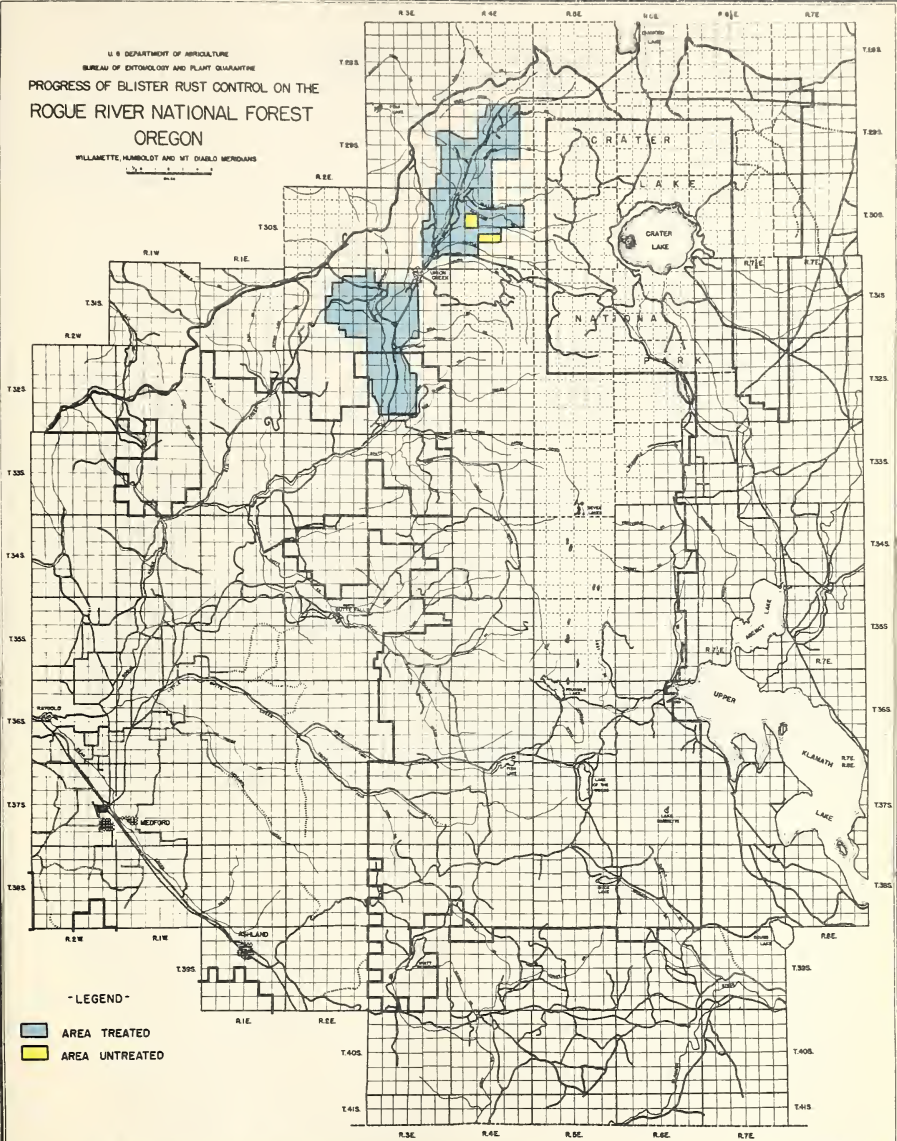
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U. S. DEPARTMENT OF AGRICULTURE  
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE  
PROGRESS OF BLISTER RUST CONTROL ON THE  
ROGUE RIVER NATIONAL FOREST  
OREGON

WILLAMETTE, HUMBOLDT AND MT. DIABLO MEMORIALS

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ANNUAL REPORT 1951

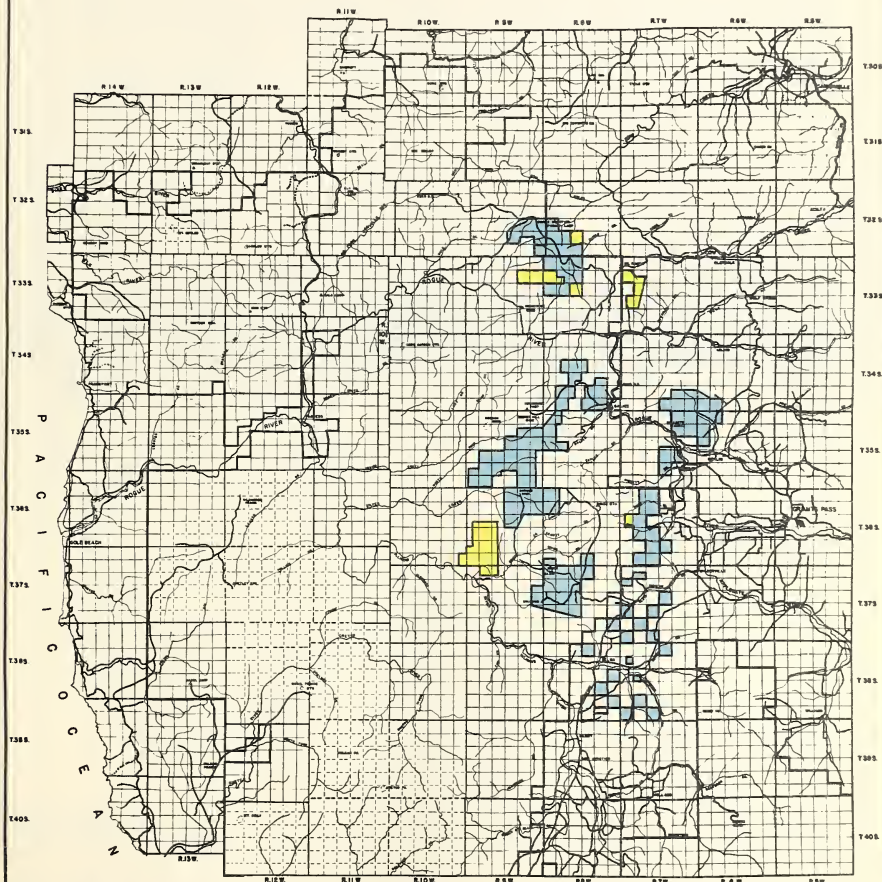


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BUREAU OF ENTOMOLOGY AND PLANT GUARANTEE  
PROGRESS OF BLISTER RUST CONTROL ON THE  
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OREGON

WILLAMETTE AND HUMBOLOLT RIVERBASINS

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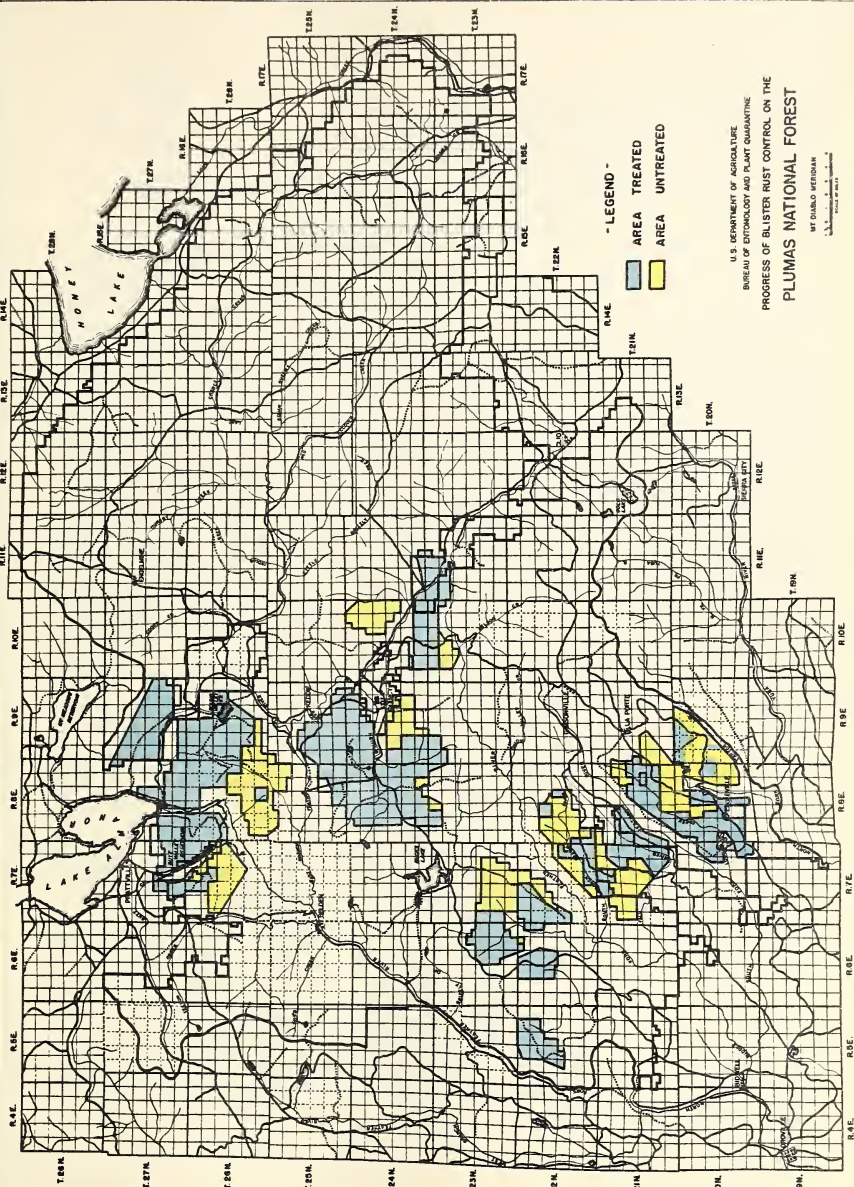




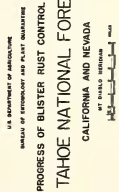






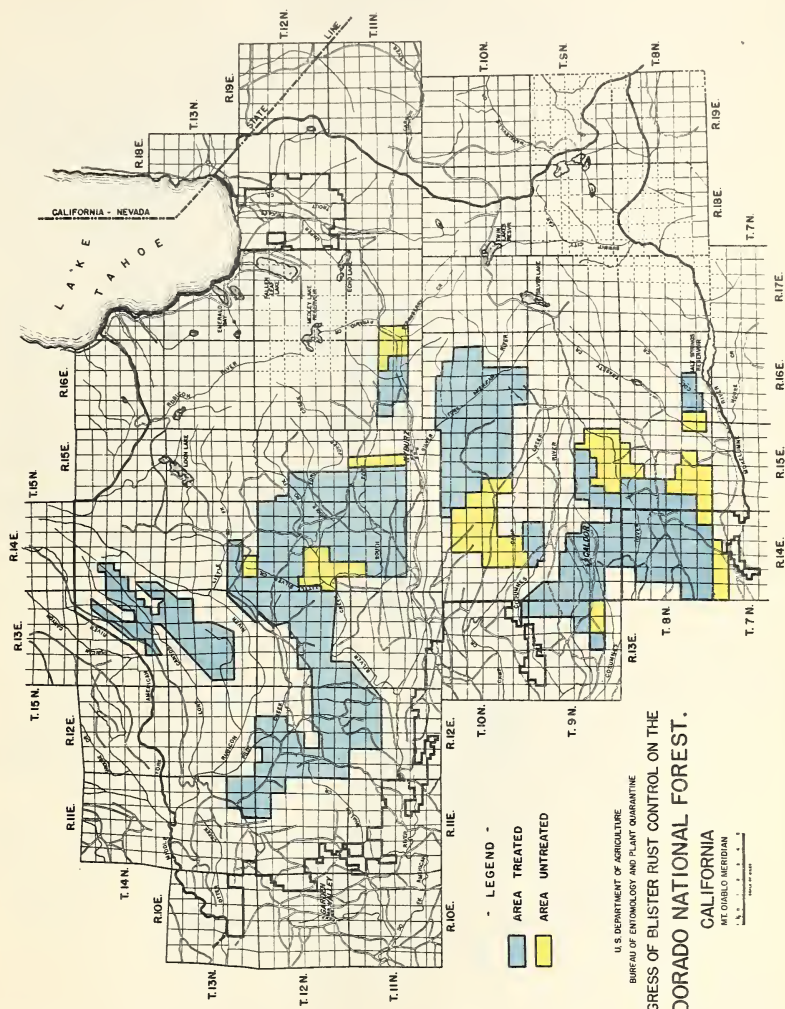








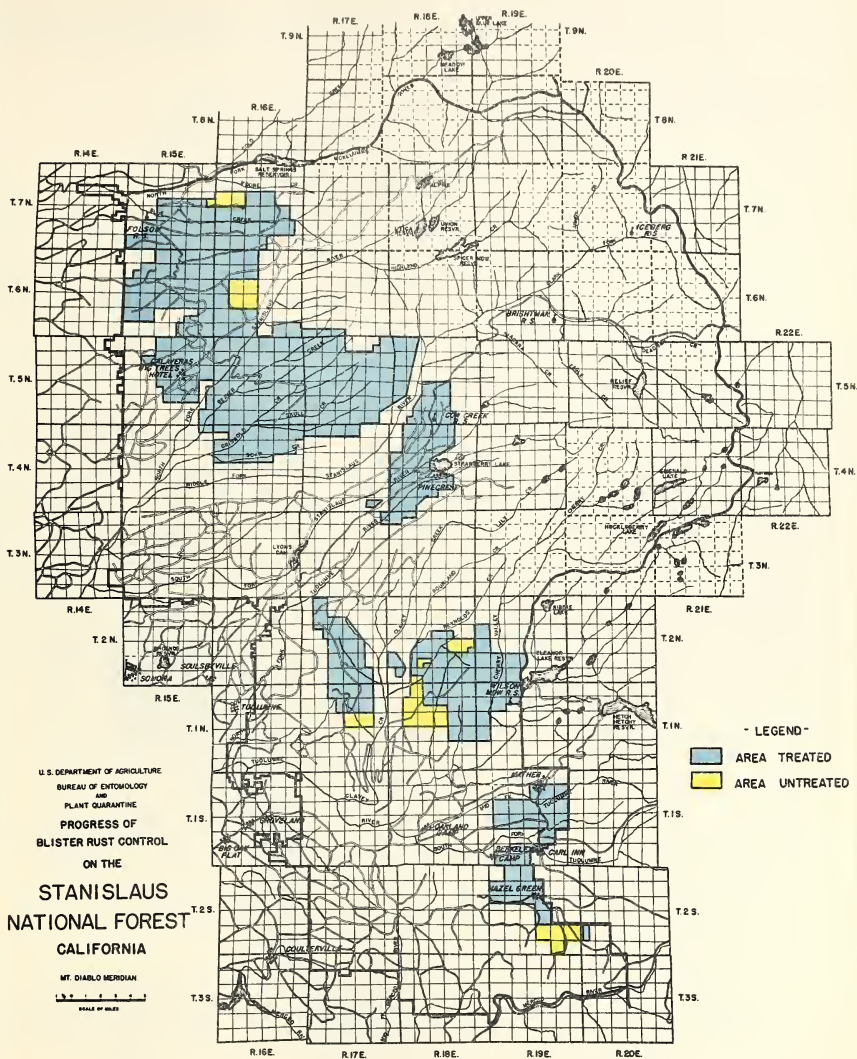




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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE  
**PROGRESS OF BLISTER RUST CONTROL ON THE  
ELDORADO NATIONAL FOREST.**  
CALIFORNIA  
MT. DIABLO MERIDIAN  
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SCALE OF MILES



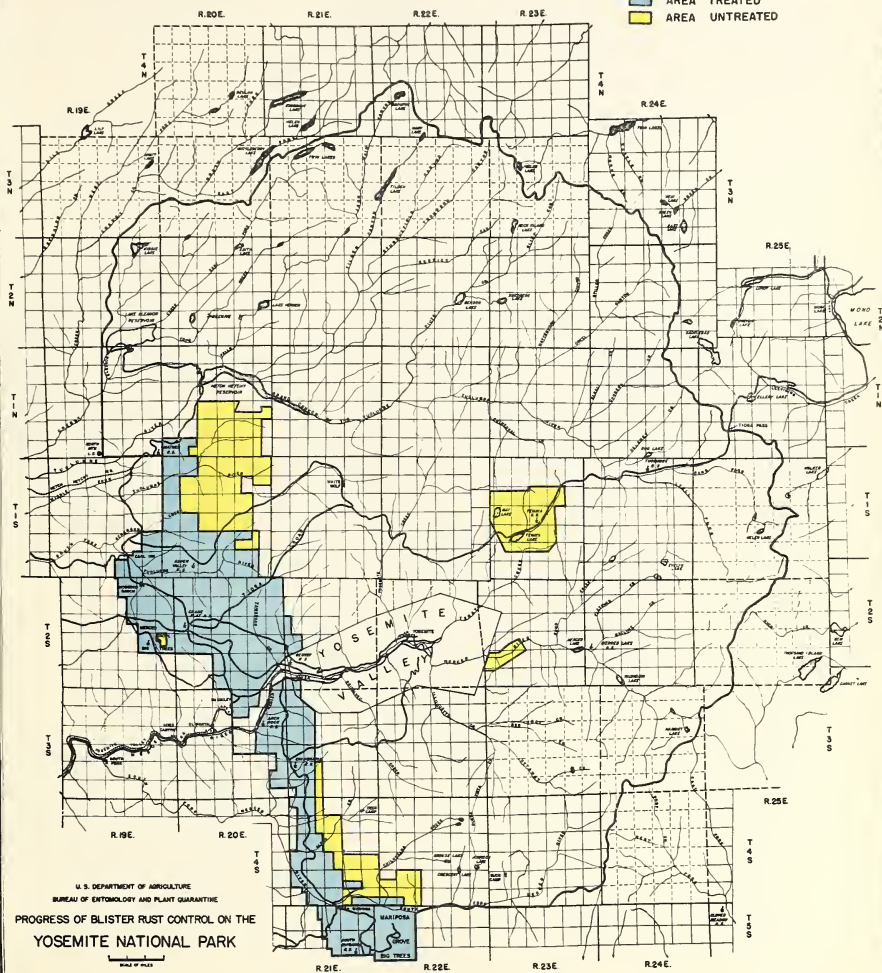






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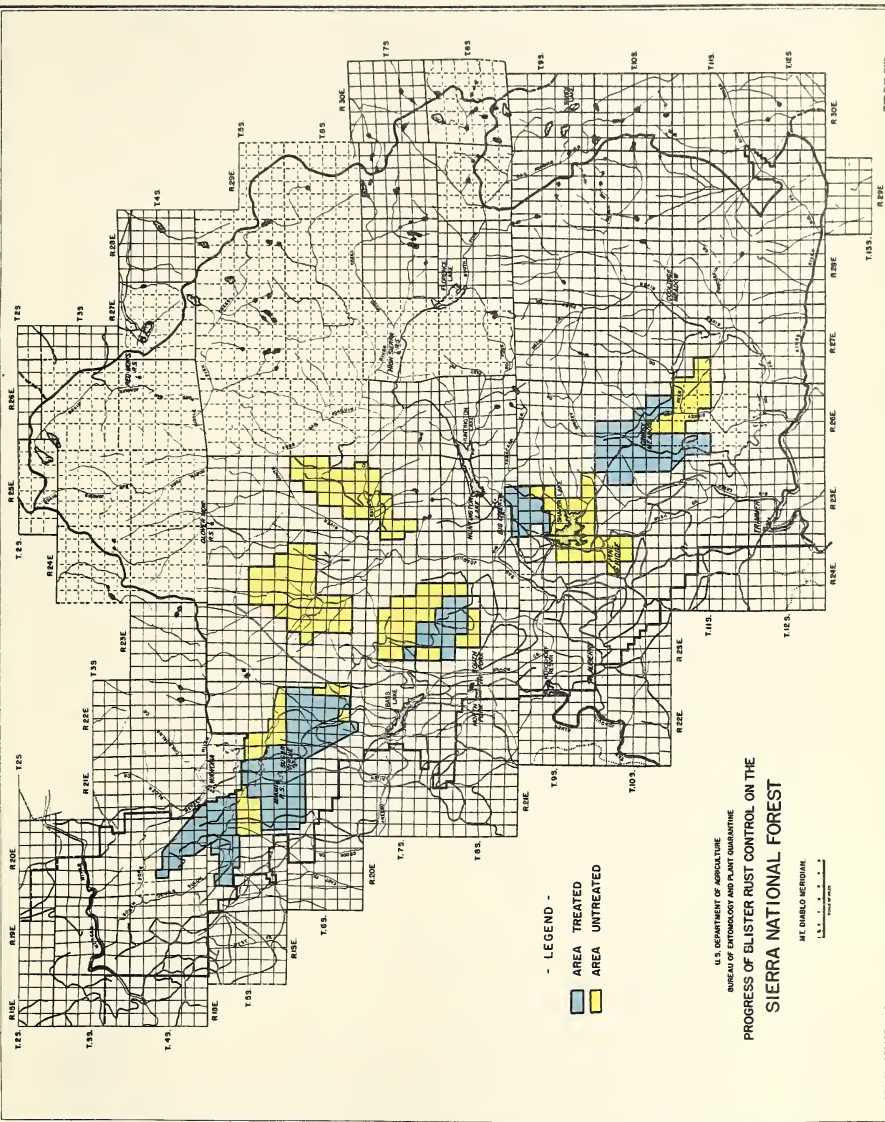
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ANNUAL REPORT 1951

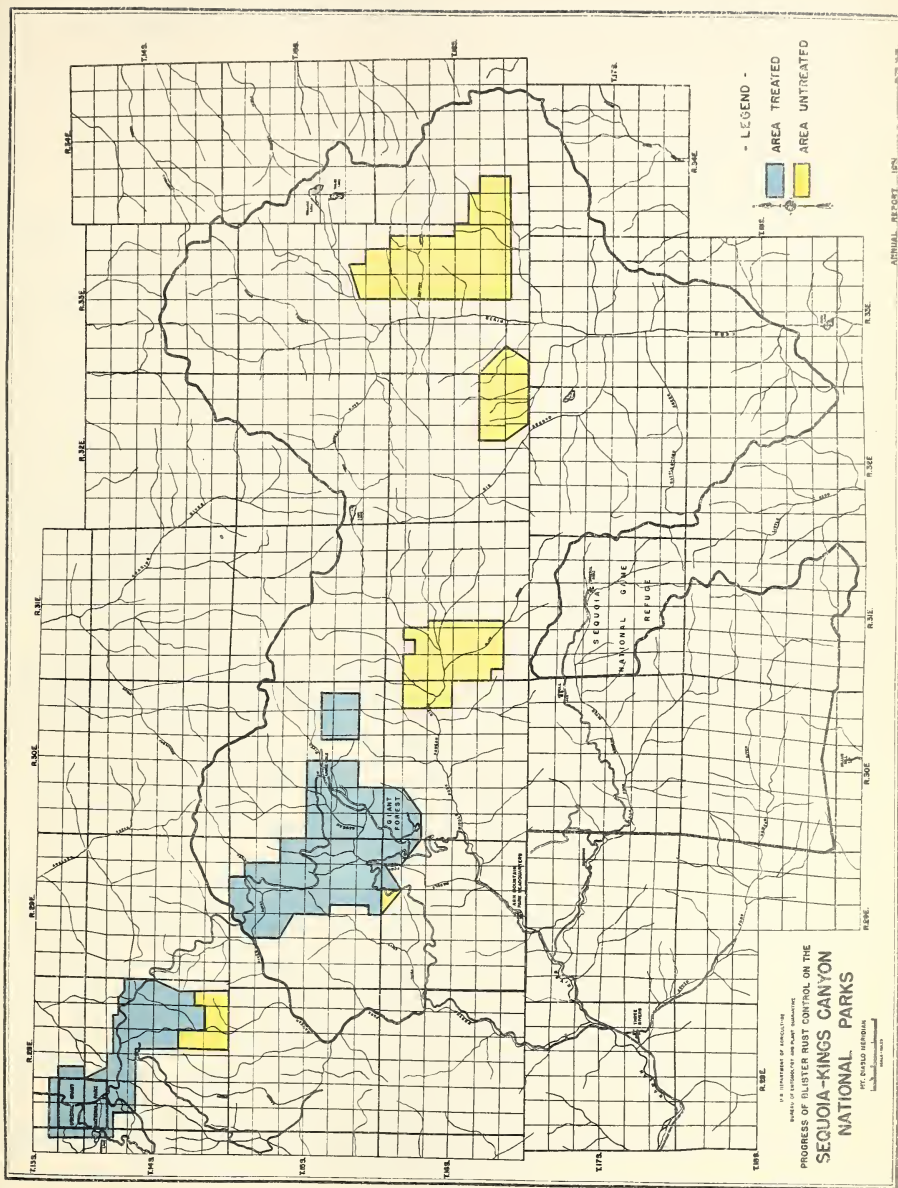
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BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE















## PART III

### COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS IN 1951

By

John C. Crowell, Agent

#### ADMINISTRATION

##### Purpose

The purpose of this Project is to protect from blister rust selected white pine stands growing on state and privately owned lands. The Project is financed by a fund made of federal contributions matching in amount all those contributed by the State of California and private agencies.

##### Cooperation

The Lea Act of 1940 provided the framework for the cooperation of state, federal, and private agencies in California. The large appropriation made by California and matched with federal funds has again made possible an extensive program of ribes eradication, coupled with a broad program of pine appraisal work. The ribes eradication work and surveys necessary for the attainment of the objectives of the cooperative program were financed by an appropriation of \$168,437 by the State of California, \$2,200 contributed by private land owners, and an equal sum allocated by the Federal Government.

An additional item of indirect aid of considerable importance to the control program was the contribution by the State of California of services of two California Youth Authority camps toward ribes eradication work. The value of these services was \$16,351.

The Bureau of Entomology and Plant Quarantine furnished the leadership, coordination, and technical direction of the blister rust control program conducted under this Project. Costs for checking, pine appraisal, and scouting on state and private lands were defrayed from the cooperative funds.

##### Administrative Camps

The cooperative project again established small administrative camps in order to provide suitable headquarters for supervisory and technical personnel in the field. One camp was located at Soda Springs on the Lassen National Forest; one was at Caldor on the Eldorado National Forest; a third was at Hinkleman's on the Stanislaus National Forest. There were no eradication camps as such this year, marking a departure for the first time from former practice. A small spray camp on the Sierra National Forest, a checking camp on the Klamath National Forest that was moved to the Shasta National Forest in July, and a scouting camp on the Eldorado made up the remainder of the camp program for 1951. Administrative and technical personnel were quartered in these camps and in State Division of Forestry

establishments located on control areas. The administrative camps were considered indispensable to the proper supervision of the field work by providing office space, equipment storage, and subsistence facilities for the supervisory and technical staff.

#### LOCATION AND METHODS OF WORK

##### Ribes Eradication

The ribes eradication program of the cooperative project for 1951 was a combination of contracting procedures and hand eradication by force account. A limited amount of hand eradication was accomplished by a four-man crew operating out of each of the administrative camps mentioned above. Two CYA camps, one located at Whitmore on the Lassen National Forest and one at Dew Drop on the Eldorado National Forest, provided crews for the continuation of hand eradication of ribes as during previous years. The Benedict Meadows camp on the Sierra National Forest engaged in chemical spray work, using Navajo Indian boys with success. The following table shows the location of the camps and the number of men engaged in ribes eradication work during 1951.

CAMPS PERFORMING WORK ON STATE AND PRIVATE LAND

Forest	Type of Camp	Name of Camp	Number of Men	
			Eradicators	Technical and Supervisory
Shasta Klamath	Checking and	Pondosa		
	Administrative	Hungry Creek	0	8
Lassen	Hand erad. CYA	Whitmore	6	3
	Administrative	Soda Springs	3	6
Eldorado	Hand erad. CYA	Dew Drop	20	1
	Scouting	Hunter's Valley	0	8
	Administrative	Caldor	0	5
Stanislaus	Administrative	Hinkleman	3	4
Sierra	Spray	Benedict Meadows	8	5
Totals	8 Camps	-	40	40

##### Contracting

Continuing the policies established during 1950, ribes eradication under contract procedure has as its objective the performance of as much work by this means as is practicable. A total of 13,784 acres were treated, of which 9,792 acres, or 71 per cent, were contracted. This represents an increase of 15 per cent over the acreage contracted during 1950.

Contractors were in sufficient numbers during the field season to keep the bidding on a satisfactorily competitive basis. Many were experienced in contracting from 1950 while others had gained eradication experience when employed in blister rust control camps during previous years. On several operations it was necessary to operate short-term demonstrations to acquaint a few contractors with methods and techniques of ribes eradication. Results of the expanded program of contracting were satisfactory.

### Camp Hand Eradication

A small amount of hand eradication work was done by employees operating out of the administrative camps. The hand eradication crews were used to clean up scattered small plots where conditions did not readily permit inclusion with contracted areas. Crews from the two CYA camps worked approximately 2,075 acres during the season. This is a creditable showing considering the diversion caused by a number of forest fires during the summer. These camps used the supervised crew formation. All work performed by CYA crews met the prescribed control standards. The scope of the hand eradication program is shown in the preceding table and the results will be found in tables 1 and 2 following this section of the report.

### Camp Chemical Eradication

The largest spray operation on state and private lands was on the Sierra National Forest where an eight-man crew was stationed at the Benedict Meadows camp. Navajo Indian boys recruited for this camp reported on May 21. The camp was closed during the first week in September. Various methods of application of chemicals were tested including the sure-shot, knapsack sprayers, power sprayers, and high-fog types. Results of the basal stem treatment indicate that it averages one and a half times faster than digging the ribs and the percentage of kill is very satisfactory. On the Eldorado National Forest 70 acres were sprayed with 2,4-D solution by power spray rig. A more complete discussion of the chemical spray program will be found in Part II of this report.

### Pine Appraisal

The pine appraisal job in California, a project that has been actively pushed during the two previous years, was continued through 1951. It is anticipated that the job can be concluded in 1952. A pine appraisers' school was conducted at the Soda Springs camp on the Lassen National Forest during the week of May 15, 1951. Eleven Forest Service men and nine Bureau men attended, thus promoting a uniformity in methods throughout the region. During the field season 65,414 acres of pine-producing land was appraised for the cooperative project at an expenditure of 576 man days. To date the job is about 80 per cent completed. From the data collected it appears that the area inside control units may be reduced about 45 per cent and still retain 85 per cent of the sugar-pine-grazing capacity. In order to expedite the conclusion of the final appraisal of sugar pine areas by 1952, four of the temporarily employed technicians, all forestry school graduates, were given temporary appointments by the Bureau. They will be retained over the winter of 1951-52 to summarize the data, to prepare maps, and assist with preparation and execution of the work plans for 1952.

### Klamath National Forest

The agreement with the U. S. Forest Service whereby the Bureau of Entomology and Plant Quarantine would assume responsibility for a 13,579 acre unit of intermingled ownership was continued through 1951. Cooperative funds were used to finance only the work done on state and private lands.

A shortage of good contractors for ribes eradication in this area resulted in only 53 acres receiving treatment. This situation may eventually necessitate the establishment of small mobile units of force-account labor for the performance of such work.

A checking and administrative camp composed of eight men was established at the Hungry Creek campsite on June 12. Post checking of 1,604 acres of state and private land was the principal activity. Late in July the camp was moved to Pondosa on the Shasta National Forest.

Disease surveys were conducted by three men from the checking crew especially trained for the work. An area of 1,920 acres was covered. Results of this survey and others indicate that control measures in the Beaver Creek unit are effective. Losses from blister rust are heavy due to infection occurring prior to ribes eradication. Control work thus far has checked additional damage. For 1952 it is recommended that post checking and a small amount of maintenance work be done.

#### Shasta National Forest

The blister rust control work on the Shasta National Forest was confined to the Pondosa unit. Rust is sprinkled lightly over this area and damage to pine is negligible to date. An intensification in damaging proportions is probable at any time if favorable climatic conditions should occur. No ribes eradication work was done by the cooperative project during 1951. A checking and administrative camp was moved in from the Klamath National Forest on August 1. The men from this camp completed 1,292 acres of advance checking on private land in preparation for future contract work. Pine appraisal work was completed on 2,670 acres of outover land in the headwaters of the Clark Creek drainage. In addition, the checking crew handled the contract work and checking for the U. S. Forest Service on a reimbursable basis.

It is recommended that the eradication work on all private land in the Pondosa area be completed in 1952 and that the pine appraisal project be completed on the Whitehorse area.

#### Lassen National Forest

The contract program accounted for ribes eradication on 4,290 acres of private land at a cost of \$26,352. The average bid price per acre was \$6.14. An additional 4,843 acres were checked and found to meet the standard without need of working. A three-man crew from the Soda Springs camp worked 471 acres at an expenditure of 107 man days. This acreage was made up of small blocks scattered over 15 sections of land.

A crew of six youths from the Whitmore (State) CYA camp, supervised by a Project foreman, worked 70 acres of stream type within the Latour State Forest. Infected pines were found along the streams. Forty-one man days were required to complete this job.

By the intensive pine appraisal strip method, 18,025 acres were covered. The ocular or extensive method accounted for an additional 6,720 acres. This job required 207 man days at a cost of \$2,746.



The cooperative project completed 7,907 acres of regular checking, 2,418 acres of advance checking, and 4,685 acres of post checking. The 559 man days required to complete the job cost \$6,454. The emphasis placed on securing accurate checking data slowed down production early in the season but this situation was later remedied. The accuracy of the checking work is believed to have reached an all time high during 1951.

Foremost among the problems encountered this year was that of poor work by contractors in proportions hitherto never experienced. A total of 81 items were advertised and 53 separate contracts were awarded to 23 contracting firms composed of 51 individuals or partners. At one time or another 15 of the 23 contractors were in trouble involving such matters as repeated reworkings, leaving crowns, delays, and general sub-standard work and progress. In many cases this trend was not discovered immediately because there was a lag of requests for inspection when the contractors were working their first blocks. A flood of requests came in at a time when several checkers had resigned. Some splendid and greatly needed assistance from the checking staff of the Plumas National Forest helped out over this crucial period. It became apparent that some contractors had developed the tendency to rework their areas too hastily, hoping to get an item approved by "soft checks", or technically through successive checks to take advantage of sampling error. The general problem was solved through personal field contacts with contractors and by rigidly enforcing the terms of the contract.

Control measures appear to be effective in holding back the spread of blister rust over the Lassen National Forest. More than a score of distinct pine infection sites have appeared during recent years, yet none of these established themselves as active centers of infection.

Contracts have already been awarded for completion in 1952 covering an area of 2,284 acres at a cost of \$14,203. The average bid price for these contracts is \$6.23. This will complete the present eradication cycle in the Flea Valley and Butte Meadows units. It is recommended that 3,000 acres, mostly in the Lyonsville unit, be contracted in 1952. This would complete the initial eradication work in that area originally started in 1949. Approximately 20,000 acres of pine remain to be appraised. A slightly larger checking program is required for 1952, which should include about 7,000 acres of regular, 2,000 acres of advance and 10,000 acres of post checking. Approximately one-fifth of this checking will be for the U. S. Forest Service on a reimbursable basis.

#### Plumas National Forest

All work done on state and private lands during the current year was accomplished through contract procedure. Work commenced May 1 and terminated October 1. Initial eradication of ribes was performed on 457 acres at a contracted cost of \$3,775, averaging \$8.26 per acre. Reeradication work was done on 2,244 acres at a cost of \$13,248, or \$5.90 per acre. For the entire operation the average cost per acre was \$6.30, which is about 30 per cent under the appraised maximums. The contract program was smaller this year primarily due to awaiting the results of the pine appraisal.

The pine appraisal project included 19,315 acres examined by strip surveys and 6,955 acres classified by ocular examination. Most of the privately owned cutover land has been sampled and only scattered small areas remain to be appraised. All pine appraisal work should be completed in 1952.

Checking work included 223 acres of advance, 4,623 acres of post and 4,942 acres of regular checking. Some delays were encountered near the end of the season when all personnel, including checkers, were called out to fight a fire on Milk Ranch Creek. In spite of losing a full week, the regular checking was completed by the end of the field season.

The problem of finding a sufficient number of contractors is more acute since the discontinuance of large force-account camps. A partial solution seems to lie in developing a number of contractors among the local residents. Four contracting partnerships were developed this year, and additional parties will be sought in 1952. Thus, it is hoped that a sufficient number of qualified contractors can be carried over from year to year as a nucleus for starting the program the following spring.

There were no significant developments in the spread of the rust during 1951. Two infection centers, one on Wildcat Creek and one on Grizzly Creek, were probably burned out by forest fires late in 1951.

Recommendations for 1952 include the initial eradication of ribes on recently cutover lands; the continued reeradication of ribes where post checking indicates the need; the completion of the pine appraisal survey; a close study of the behavior of the rust on known infection centers on the forest; and the examination of the mature stands of pine as a basis for a long range blister rust control program.

#### Eldorado National Forest

Ribes eradication work was performed on 2,556 acres of state and private lands during 1951. Approximately 1,900 acres of this area were worked by a 20-man crew from the State CYA camp at Dew Drop. In addition, 70 acres were sprayed with a power spray rig, using a foliage spray of 2,4-D aqueous solution. Contracts were awarded for 551 acres in the amount of \$3,871 at an average price of \$7.03 per acre.

Pine appraisal strip surveys were made on about 5,000 acres and another 5,000 acres were given an ocular survey.

No special problems were encountered during 1951. Contractors were in sufficient numbers to keep the bidding on a competitive basis. Their work was for the most part satisfactory.

For 1952 it is recommended that about 3,000 acres be contracted and another 1,500 acres be worked by CYA crews. Ribes eradication work should be commenced in the high-hazard virgin-timber stands. The pine appraisal project should be pushed to completion.



## Stanislaus National Forest

A four-man crew from the Hinkleman camp completed the needed reeradication of ribes in the Calaveras Big Tree State Park and, in addition, worked small blocks between contracted items on the Stanislaus National Forest. Working from May to November, the four-man crew covered 566 acres. In the Dorrington and Grizzly Meadows areas, contractors treated 2,214 acres at a cost of \$11,710, or \$5.29 per acre. Lively competition among bidders resulted in this rather low per acre cost.

One pine appraiser covered 6,105 acres during the season. This was adequate for immediate plans. The project can be completed next season by one appraiser.

Of particular significance was the discovery of blister rust on sugar pines on Moore Creek in the northern part of the Stanislaus National Forest in Calaveras County. This rust center had its origin during 1944. There were 84 trees found infected with a total of 343 cankers. The known limits of blister rust infection have thus been extended southward by 13 miles.

Plans for 1952 should provide for ribes eradication by contract in the Dorrington and Grizzly Meadows areas. The first reeradication job will be due on lands of the Winton Lumber Company on Forest Creek. The pine appraisal job should be completed in 1952.

## Sierra National Forest

One camp, located at Benedict Meadows, housed a crew of eight men during the season. Six hundred and fifteen acres were treated with chemicals by means of various types of spray applicators. This completed the spray work on private land in the Whiskey Falls unit. The primary purpose of the spray work this year was to reduce the heavy ribes populations to a point where the area would be suitable for contracting procedure. The use of Navajo Indian boys as laborers proved satisfactory in that labor turnover and disciplinary problems were negligible. These boys were wards of the Office of Indian Affairs, Department of the Interior, and attend the Indian schools in Nevada and California. They were mostly 18-year olds with no previous experience in blister rust control. Language difficulties and minor problems of supervision were overcome by painstaking effort on the part of the camp superintendent and his staff. The boys were made available to the Project from early May to mid-September. Further use of this type of labor is recommended.

Pine delineation was completed on approximately 5,600 acres of private land during the season. Further work will be required in 1952 to complete this project.

There are no known infection centers of blister rust on the Sierra National Forest; nevertheless, control work is being pushed to gain the initial advantage of ribes suppression on the high priority sugar pine stands of the forest. At the present time 43,602 acres of privately owned pine-bearing lands are included in control units, of which 17,334 acres have been given initial protection from blister rust. Further protection work

should be coordinated with the timber cutting program and made an integral part of the management plan for this forest. Ribes eradication work in 1952 on private lands should be continued, principally under the contracting procedure.

#### SUMMARY AND RECOMMENDATIONS

Blister rust control in California was advanced through the eradication of ribes on state and private lands during 1951 as follows:

Initial working	-	2,999 acres
Rework areas	-	10,785 "
Blocked out by checker's inspection	-	7,553 "
Total area receiving protection	-	<u>21,337 acres</u>

Control units, as established during 1951, included 618,600 acres of state and privately owned land. As of December 31, 1951, a total of 362,901 acres, representing 59 per cent of the area, had received protection from blister rust. The contract program accounted for 71 per cent of the acreage worked this year and the remaining 29 per cent was done by hired labor and CYA workers. The pine appraisal program accounted for the classification of 65,414 acres of state and private lands, bringing this job to about 80 per cent of completion. The present broad scale program of blister rust control on state and private lands has been made possible by the cooperative effort of the State of California in appropriating a substantial annual sum which has been matched by the Federal Government under the terms of the Lea Act of 1940.

The following recommendations concerning the future of the cooperative program in California are made as a means of protecting the best stands of sugar pine from blister rust:

1. Complete the pine appraisal project in 1952.
2. Make advance and post checks as required on pine areas previously appraised and found to be suitable for blister rust control.
3. Continue protective work on areas of highest priority by removal of ribes consistent with economic and pathological factors involved.

TABLE 1

## SUMMARY OF COOPERATIVE RIBES ERADICATION IN CALIFORNIA - 1951

Control Operation	Acres		Man Days		Thousands of Ribes Destroyed	Per Worked Acre		Ownership of Acres Covered				
	Checked and Meeting Standards Without Work	Total	Eradication	Check- ing		Total	Eradication	Days	Ribes	Federal	Private	State
Initial												
Lassen	1,156	155	1,311	345	140	485	36	0.30	31	24	1,287	-
Plumas	457	112	569	187	63	250	44	0.41	96	14	555	-
Eldorado	241	-	241	54	6	60	15	0.22	62	-	241	-
Stanislaus	469	37	506	309	28	337	65	0.66	139	48	458	-
Sierra	606	-	606	548	-	548	627	0.90	1,035	41	565	-
Latour State For.	70	-	70	41	-	41	4	0.58	57	-	-	70
Totals	2,999	304	3,303	1,484	237	1,721	791	0.49	264	127	3,106	70
Reeradication												
Lassen	3,605	4,760	8,365	800	518	1,318	99	0.22	27	475	7,890	-
Plumas	2,244	468	2,712	558	232	790	126	0.25	56	231	2,481	-
Eldorado	2,315	-	2,315	1,762	97	1,859	320	0.76	138	-	2,315	-
Stanislaus	2,311	662	2,973	623	136	759	210	0.27	91	30	2,943	-
Sierra	45	-	45	60	-	60	21	1.33	467	45	-	-
Calaveras Big Tree State Park	265	1,359	1,624	62	49	111	8	0.23	30	-	120	1,504
Totals	10,785	7,249	18,034	3,865	1,032	4,897	784	0.35	73	781	15,749	1,504
All Workings												
Lassen	4,761	4,915	9,676	1,145	658	1,803	135	0.24	28	499	9,177	-
Plumas	2,701	580	3,281	745	295	1,040	170	0.27	61	245	3,036	-
Eldorado	2,556	-	2,556	1,816	103	1,919	335	0.71	131	-	2,556	-
Stanislaus	2,780	699	3,479	932	164	1,096	275	0.33	99	78	3,401	-
Sierra	651	-	651	608	-	608	648	0.93	100	86	565	-
Latour State For.	70	-	70	41	-	41	4	0.58	57	-	-	70
Calaveras Big Tree State Park	265	1,359	1,624	62	49	111	8	0.23	30	-	120	1,504
Totals	13,784	7,553	21,337	5,349	1,269	6,618	1,575	0.38	114	908	18,855	1,574

TABLE 2

## SUMMARY OF COOPERATIVE RIBES ERADICATION IN CALIFORNIA 1941-1951

Control Operation	Acres	Men Days	Thousands of Ribes Destroyed	Ownership of Acres Covered	
				Federal	Private
Initial					
Klamath	145	76	6	-	145
Lassen	63,251	36,613	5,463	9,794	53,430
Plumas	19,988	25,072	5,821	5,062	14,926
Eldorado	20,336	17,715	2,901	2,158	18,178
Stanislaus	3,824	2,997	812	1,862	1,962
Sierra	980	917	1,009	101	879
Latour State Forest	2,858	884	40	-	1,344
Totals	111,382	84,274	16,052	18,977	90,864
Reeradication					
Klamath	1,392	264	14	280	1,112
Lassen	55,593	15,071	1,810	7,726	47,807
Plumas	16,233	6,960	1,392	1,808	14,425
Eldorado	35,350	17,396	2,195	4,880	28,206
Stanislaus	44,050	16,708	2,737	5,015	39,035
Sierra	9,086	6,010	507	5,064	4,022
Calaveras Big Tree State Park	2,749	577	31	-	195
Totals	164,453	62,986	8,686	24,773	134,802
All Workings					
Klamath	1,537	340	20	280	1,257
Lassen	118,844	51,684	7,273	17,520	101,237
Plumas	36,221	32,032	7,213	6,870	29,351
Eldorado	55,686	35,111	5,096	7,038	46,384
Stanislaus	47,874	19,705	3,549	6,877	40,997
Sierra	10,066	6,927	1,516	5,165	4,901
Latour State Forest	2,858	884	40	-	1,344
Calaveras Big Tree State Park	2,749	577	31	-	195
Totals	275,835	147,260	24,738	43,750	225,666

TABLE 3

## SUMMARY OF RIBES ERADICATION BY THE BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE 1925-1940

Control Operation	Acres	Man Days	Ribes Eradicated	Ownership of Acres Covered				
				National Forest	Federal		Private	State
					BIM	Total		
Initial Work								
California:								
Lassen	20,560	4,894	1,022,866	4,660	-	4,660	15,900	-
Plumas	77,039	39,581	9,412,114	21,613	-	21,613	55,386	40
Mt. Hood	103,307	55,283	15,165,858	25,945	-	25,945	74,760	2,602
Stanislaus*	132,591	58,691	19,422,485	25,415	-	25,415	106,769	407
Calaveras Big Trees State Park	1,868	1,339	188,261	-	-	-	120	1,748
Sierra	50,418	76,090	15,995,271	35,638	-	35,638	14,780	-
Oregon:								
Rogue River	140,452	46,630	15,798,559	65,155	5,394	70,549	69,903	-
Siakiyou	57,844	10,789	761,516	6,662	19,539	26,201	31,343	300
Klamath	4,568	6,489	533,529	3,739	-	3,739	829	-
Nursery Sanitation	830	352	5,019	-	-	-	418	412
Mt. Hood	2,649	1,651	194,292	2,649	-	2,649	-	-
Totals	592,126	301,789	78,499,770	191,476	24,933	216,409	370,208	5,509
Reeradication								
California:								
Lassen	1,860	323	11,598	717	-	717	1,143	-
Plumas	19,549	10,984	1,292,965	6,369	-	6,369	13,180	-
Mt. Hood	23,041	13,755	1,196,918	6,693	-	6,693	16,348	-
Stanislaus**	52,883	21,689	5,057,429	24,920	-	24,920	27,963	-
Calaveras Big Trees State Park	215	26	4,792	-	-	-	-	215
Sierra	1,185	1,421	223,582	885	-	885	300	-
Oregon:								
Rogue River	33,142	7,517	939,462	20,950	-	20,950	12,192	-
Mt. Hood	1,766	1,337	357,856	1,766	-	1,766	-	-
Totals	133,641	57,052	9,084,602	62,300	-	62,300	71,126	215
All Workings								
California:								
Lassen	22,420	5,217	1,034,464	5,377	-	5,377	17,043	-
Plumas	96,588	50,565	10,705,079	27,982	-	27,982	68,566	40
Mt. Hood	126,348	69,038	16,362,776	32,638	-	32,638	91,108	2,602
Stanislaus	185,474	80,380	24,479,914	50,335	-	50,335	134,732	407
Calaveras Big Trees State Park	2,083	1,365	193,053	-	-	-	120	1,963
Sierra	51,603	77,511	16,218,853	36,523	-	36,523	15,080	-
Oregon:								
Rogue River	173,594	54,147	16,738,021	86,105	5,394	91,499	82,095	-
Siakiyou	57,844	10,789	761,516	6,662	19,539	26,201	31,343	300
Klamath	4,568	6,489	533,529	3,739	-	3,739	829	-
Nursery Sanitation	830	352	5,019	-	-	-	418	412
Mt. Hood	4,415	2,988	552,148	4,415	-	4,415	-	-
Totals	725,767	358,841	87,584,372	253,776	24,933	278,709	441,334	5,724

\*Includes 7,516 acres, 3,905 man days, and 1,217,951 ribes on lands worked by the Bureau of Entomology and Plant Quarantine now in Yosemite National Park.

\*\*Includes 480 acres, 326 man days, and 298,657 ribes on land worked by the Bureau of Entomology and Plant Quarantine now in Yosemite National Park.





## PART IV

### BLISTER RUST CONTROL BY THE FOREST SERVICE IN 1951

By

Harold L. Mitchell, Operation Leader

#### INTRODUCTION

The Forest Service blister rust control program in 1951 was conducted in selected white and sugar pine stands on seven national forests in California and three in Oregon. Areas treated were selected on basic data collected on pine appraisal and disease surveys supplemented with ecological studies. On the basis of this information, 16,073 acres were contracted to competitive bidders, 4,809 acres were worked by camp crews, and 572 acres were chemically treated, giving a total of 21,454 acres on which ribes were destroyed.

A revised working agreement between the Forest Service of Region 5 and the Bureau of Entomology and Plant Quarantine went into effect on July 27, 1951. The existing agreement between the Forest Service of Region 6 and the Bureau of Entomology continued in effect.

#### SCOPE OF WORK

The eradication program was smaller in 1951 than it has been for the past few years. Though the amount of initial eradication accomplished each year has remained about the same (12,000 to 15,000 acres), there has been a considerable decrease in reeradication work. Over the past four years the areas needing additional treatment have averaged about 25,000 acres. During 1951 only 9,000 acres required work. However, the size of the program this year was large enough to accomplish the necessary reeradication on areas ecologically ready for treatment. As expected, part of the reduction in acreage is due to the local control concept, although several other factors influence the reeradication program. Two of the most important are:

1. During the past few years a concerted effort was made to bring all eradication work up to date on recently cutover lands. In 1951 only a small percentage of the lands falling within this category were ready for treatment. This, however, does not indicate a trend, and the amount of reeradication work will fluctuate from year to year, depending upon ecological development of ribes and the amount of yearly disturbance.
2. Large portions of the older cutover areas have been placed in a near-maintenance condition by successive ribes eradication. As a result the acreage requiring treatment decreases with each working, and as the time interval between workings increases.



One of the main objectives in 1951 was to contract a greater amount of the eradication work. An analysis shows that 75 per cent of all eradication work in 1951 was done by contract as compared with 66 per cent in 1950. On the Lassen, Eldorado, and Stanislaus all hand eradication in 1951 was accomplished through contracting, while on the other forests in the Project a combination of force-account labor and contracting was employed.

Of the five camps operated by the Forest Service this year, four were in California and one in Oregon.

National Forest	Location of Camp	Size of Camp	Type of Labor
Oregon			
Rogue River	Union Creek	14	Regular
California			
Plumas	Camel Peak	50	Inmate
Tahoe	Cherokee Creek	25	Inmate
	Soquel	40	Inmate
Sierra	Whiskey Falls	65	Inmate

Eradication by chemical methods was confined to areas supporting heavy concentrations of large ribes. The ribes in these areas were treated with a foliage application of 2,4-D and 2,4,5-T herbicides in aqueous solutions. Approximately 150,000 gallons of spray were used in treating ribes on 572 acres averaging 2,600 ribes per acre. Four truck-mounted spray rigs were operated; one on the Plumas, one on the Stanislaus, and two on the Sierra.

#### ACCOMPLISHMENTS

##### Umpqua National Forest

Initial eradication on approximately 6,300 acres of this unit was completed in 1948, but additional treatment will be deferred until actual timber management practices are initiated by the Siskiyou-Cascade Research Center.

##### Rogue River National Forest

Eradication work on 5,101 acres was accomplished through a combination of force-account labor and contracting. Most of the work was done by eight parties of contractors who removed ribes from 4,481 acres at an average bid price of \$3.44 per acre. A 14-man camp at Union Creek, operating from June 1 to September 6, worked the remaining 620 acres at an average rate of 0.47 man days per acre. A total of 232 man days were lost to fire fighting. Additional time was lost when, following the first fires, the camp suffered nearly a 100 per cent turnover in personnel.

Permanent personnel and overhead pruned approximately 40 acres of white pine reproduction in the Jim Creek and Needle Creek clear-cut areas. All visible cankers were removed as well as all branches up to a height consistent with good silvicultural practice. Approximately 7,000 trees were examined and pruned.

Pine appraisal surveys by the Forest Service covered 9,230 acres of cut-over lands. The work was performed by two men working out of the Mill Creek camp at an average cost per acre covered of \$0.24.

Within the past few years mining claims have been filed on approximately 43,000 acres of timberland in the 67,000-acre Rogue River control unit. The validity of these claims is in question, but for the present no timber can be sold on them without permission of claimants. This presents a condition which greatly affects the ribes eradication program.

In 1952 pruning and canker removal work in the Jim Creek area should be continued. The pine appraisal-disease survey work started in 1951 should be continued in the cutover areas of higher pine values. A 12-man camp at Union Creek should continue work which is not suited to contract eradication. This includes clean-up of five-needle pine planting areas, spraying Ribes bracteosum on all streams for a distance of one mile beyond the present control unit boundary, and a combination of hand eradication and spray work in scattered "hot spots" throughout the area.

#### Klamath National Forest

Control work on federal lands this season was confined to a small amount of reeradication in the north end of the Beaver Creek unit. This unit is approaching maintenance and only 53 acres needed work. The work was contracted at a bid price of \$4.98 per acre.

Eight checkers post checked the federal lands in the Beaver Creek unit. The checking was restricted to areas approaching maintenance where present ribes conditions might influence the future program in this unit.

For the 1952 season it is recommended that the post check be completed on approximately 8,000 acres of federal land in the Beaver Creek unit. Also, each piece of maintenance work should be carefully analyzed to determine whether contracting or force-account labor should be used to complete the necessary work.

#### Shasta National Forest

Control work was initiated on the Shasta National Forest this year. Initial eradication on 1,067 acres was contracted at an average bid price of \$4.99 per acre. All work was in the Pondosa area, where ribes populations averaged about 20 bushes per acre. Approximately 500 acres remain to be worked initially in this area. It is recommended that this be done in 1952.

A headquarters and checking camp, in operation from early August through October, was established at Pondosa. From here a three-man checker-flanker crew performed a second eradication on 380 acres in the Mt. Shasta Forest Nursery and adjoining protective zones.

Approximately 8,900 acres of timberland logged by the old Lamoine Lumber Company were appraised this season. Five men, operating from a camp established at Bear Gulch, worked on the appraisal during the month of October. The approximate cost of the survey was \$0.15 per acre.

For 1952, pine appraisal work should be done in the Buck Mountain area where sugar pine stocking appears to be good and rust hazards high. It is further recommended that the better sugar pine sites west of Highway 99 be examined in order to determine whether pine appraisal work would be justified.

#### Lassen National Forest

All of the eradication work on the Lassen Forest was contracted and six parties of contractors removed ribes from 844 acres at an average bid price of \$3.18 per acre. Of the total acreage covered, 567 acres received reeradication work and 277 acres were initially treated. All of the initial eradication was in the 350-acre Jenny Mountain sugar pine management area. This completes the necessary eradication in this area until regeneration develops. The reeradication program was confined to the Butte Meadows and Thumbug areas.

Within the forest there are approximately 29,000 acres of federal lands supporting sugar pine on which pine appraisal work should be done. An estimated 13,000 acres of this is sufficiently stocked so that only an ocular appraisal will be needed to establish the control boundaries; however, the remaining 16,000 acres will require a more intensive survey, and it is recommended that a pine appraisal program be initiated in 1952 in order to accomplish this need.

#### Plumas National Forest

Ribes eradication work was started on May 1 and 3,502 acres of federal lands were treated by the end of the season on October 5. Seventy-one per cent of the work was done by contractors and the remainder by camp labor. Twelve parties of contractors completed work on 2,485 acres at an average bid price of \$7.09 per acre; this included 859 acres of initial eradication and 1,626 acres of reeradication.

A 50-man prison camp, established at Camel Peak, operated from June 5 to October 5. The camp was manned with inmates from the California State Penitentiary at San Quentin. The crews worked a total of 987 acres, 900 acres of which were initial eradication. The average cost of labor and supervision for this work was \$15.20 per acre. Forty-eight per cent of the available project man days were lost to fires in one of the most damaging fire seasons the Plumas has experienced for many years.

A five-man inmate crew and one Forest Service foreman completed chemical spray treatment on 30 acres of initial eradication. One large spray rig was used for the application of 2,4,5-T as a foliage spray. The cost of labor and supervision was \$16.10 per acre. Spray work in this area will be continued next year.

A four-man pine appraisal crew completed approximately 85 per cent of the survey work needed on the federal lands. The remaining 15 per cent is mostly virgin timbered land, which should be covered this coming season.

For the 1952 field season it is recommended that the work in cutover areas be emphasized in order to keep current the reeradication follow-up after

logging. This will require work on approximately 2,000 acres scattered throughout the forest. In addition, there are approximately 2,000 acres of initial eradication work in virgin timbered areas of the Cascade unit which can be worked this next season. It is further recommended that rust infection centers be examined and the ribes removed from those areas likely to endanger bordering sugar pine management units.

With the aid of pine appraisal results the control unit boundaries of all units should be modified.

#### Tahoe National Forest

Work this year was accomplished through a combination of contracting and inmate labor. Ribes were removed from 2,741 acres for the first time on both cutover and virgin timberlands in the Brandy City unit.

The greater part of the eradication job was completed by five parties of contractors who covered 2,391 acres at an average bid price of \$6.70 per acre. Even though bid prices were a little low for initial eradication, the contractors made a fair wage and did excellent work.

In addition to the contract program the Forest Service operated a 25-man inmate camp at Cherokee Creek in the Brandy City unit. The inmates worked on ribes eradication during the month of June and spent the remainder of the season on T.S.I. work within the control units. Ribes were removed from 350 acres of federal lands at an average cost of \$11.32 per acre; this includes only the cost of labor and transportation.

Four men completed the pine appraisal work on federal lands this season. At a cost of \$0.09 per acre, 66,458 acres were delineated, of which 7,337 acres were selected for sugar pine management.

It is recommended that the control unit boundaries in the unworked portion of the Brandy City unit be modified before further eradication work is started. The contract program should be large enough to complete the remaining initial eradication in the Brandy City unit and to start initial eradication on about 1,500 acres in the Camptonville block.

#### Eldorado National Forest

Work under the Forest Service program this year was principally in the Caldor unit, and all eradication work was accomplished through contracting. Seven parties of contractors eradicated ribes from 2,739 acres at an average bid price of \$6.04 per acre. Of the areas worked only 753 acres received reeradication work; the remainder was initial treatment on recent and old cutover lands.

Approximately 15,000 acres of federal lands were classified this season by a two-man pine appraisal crew. This completes the appraisal on all cutover lands within the forest, and only a small portion of the virgin timber areas remain to be classified.

For the 1952 field season it is recommended that the remainder of the virgin timber pine appraisal be completed. Following this, tentative control unit boundaries should be set on these areas.

The necessary reeradication follow-up behind logging in 1952 will be largely confined to the Caldor and Silver Fork units, and it is recommended that eradication in these areas be given first priority. Ribes eradication work should be started in selected high hazard areas of unworked virgin timber on the forest.

### Stanislaus National Forest

Eradication of ribes from 1,252 acres of national forest land this year was accomplished by five parties of contractors and a small force-account spray crew. Initial eradication was performed on 631 acres, reeradication on 385 acres, and chemical eradication on 236 acres.

The bulk of the work was in the Niagara Creek unit, and some of the most difficult ribes eradication ever contracted on the Stanislaus was bid upon and worked this year. The items were inaccessible and supported heavy concentrations of large ribes; in spite of the difficult working conditions present, these areas were contracted at an average bid price of \$13.02 per acre.

Most of the reeradication work was in the Camp 17 area, where the average bid price was \$4.43 per acre.

A nine-man crew, quartered and subsisted at the Crane Flat camp in Yosemite National Park, continued chemical eradication (started in 1950) in the Camp 17 area. One large spray rig and one Dobbins unit were in operation from May 21 to July 20, and initial treatment of heavily concentrated ribes on 236 acres was completed. This completes all of the initial spray work in this unit.

Pine appraisal surveys on the cutover lands within the forest were continued, and a six-man crew completed the appraisal work in the Mather and Camp 17 areas. Approximately 11,000 acres of cutover lands in the Jawbone and Thompson Meadow areas and 25,000 acres of virgin timber in the north-central part of the forest remain to be classified.

Blister rust infection on the Stanislaus was found for the first time late in August this year. The infection extended for 20 chains along Moore Creek in the north end of the forest. Within the area a total of 84 trees supporting 343 cankers were found and removed. As near as can be determined the initial infection was in 1944.

It is recommended that initial eradication on about 300 acres in the Moore Creek unit be completed in 1952.

No work has been performed in the Cow Creek unit since 1947, because through successive eradications the ribes growth is in a semi-static condition. About 900 acres of this 5,000-acre control unit will require working in 1952.



Initial spray work in the Niagara Creek unit on the remaining 190 acres should be done in 1952.

### Sierra National Forest

The majority of the work this year was located in the Soquel and Whiskey Falls units, and ribes were destroyed on 3,775 acres. The work was accomplished by contractors and by inmate labor.

Two camps were established on the forest, a 40-man camp at Soquel and a 65-man camp at Whiskey Falls. Both were manned with inmates from the Soledad Medium Security Prison. The crews destroyed ribes on 2,298 acres; of this, 1,825 acres were initial eradication. The camp at Soquel was in operation for about three months, whereas the one at Whiskey Falls worked on ribes eradication from early in May until the middle of October.

Most of the contract work was in the Whiskey Falls area, and five parties of contractors completed reeradication work on 1,111 acres at an average bid price of \$7.73 per acre. Further contract work would have been done, but sufficient contractors were not available.

Chemical eradication was confined to the Whiskey Falls area where 366 acres supporting heavy ribes concentrations were treated. The work was performed by two inmate crews who operated two truck-mounted spray rigs in applying 2,4-D as a foliage spray. Work started the first week in June and continued until the middle of July at an average production rate of 2.1 man days per acre.

A pine appraisal crew consisting of from three to five men continued surveys on federal lands in the Chowchilla Mountain, Soquel, Whiskey Falls, and Dinkey Creek units.

The remaining pine appraisal work and surveys should be completed on the federal lands in 1952. The areas in the Chowchilla Mountain unit that need reeradication work should be handled by contract. In the Whiskey Falls unit the remaining spray work should be completed and other areas needing reeradication work should be treated.





TABLE 1

## SUMMARY OF RIBES ERADICATION BY THE FOREST SERVICE - 1951

National Forest	Acres			Man Days			Thousands of Ribes Eradicated	Per Worked Acre		Ownership of Acres Covered	
	Worked	Checked and Meeting Standards Without Work	Total	Eradication	Checking	Total		Eradication Man Days	Ribes	National Forest	Private
Initial Work											
California:											
Shasta	1,067		1,067	236	158	394	22	0.22	21	1,067	
Lassen	277	222	499	32	14	46	7	0.11	25	442	57
Plumas	1,779	90	1,869	2,101	130	2,231	382	1.18	215	1,789	80
Tahoe	2,741	210	2,951	1,301	134	1,435	491	0.47	179	2,951	
Eldorado	1,986		1,986	841	60	901	221	0.42	111	1,986	
Stanislaus	867		867	844	54	898	843	0.37	626	867	
Sierra	2,071		2,071	4,608	160	4,768	1,664	2.22	803	2,071	
Subtotals -	10,768	522	11,310	9,961	710	10,671	3,130	0.92	308	11,173	137
Oregon:											
Rogue River	929	491	1,420	154	65	219	17	0.16	18	1,395	25
Totals -	11,717	1,013	12,730	10,117	775	10,892	3,347	0.86	286	12,568	162
Reeradication											
California:											
Shasta	380		380	32	20	52		0.08		380	
Lassen	567	367	934	104	56	160	10	0.18	18	879	55
Plumas	1,723	174	1,897	510	150	660	137	0.29	79	1,844	53
Tahoe											
Eldorado	751	176	929	216	16	232	62	0.29	82	829	100
Stanislaus	385	170	555	203	122	325	32	0.53	239	555	
Sierra	1,704		1,704	1,041	166	1,207	369	0.61	216	1,704	
Subtotals -	5,512	887	6,399	2,106	530	2,636	670	0.38	121	6,191	208
Oregon:											
Rogue River	4,172	865	5,037	923	305	1,228	88	0.22	21	4,750	287
Klamath	53	77	130	5	82	87		0.09			130
Subtotals -	4,225	942	5,167	928	387	1,315	88	0.22	21	4,750	417
Totals -	9,737	1,829	11,566	3,034	917	3,951	758	0.31	78	10,941	625
All Workings											
California:											
Shasta	1,447		1,447	268	178	446	22	0.18	152	1,447	
Lassen	844	589	1,433	136	70	206	17	0.16	20	1,321	112
Plumas	3,502	264	3,766	2,611	280	2,891	519	0.75	148	3,633	133
Tahoe	2,741	210	2,951	1,301	134	1,435	491	0.47	179	2,951	
Eldorado	2,739	176	2,915	1,057	76	1,133	283	0.39	103	2,815	100
Stanislaus	1,252	170	1,422	1,047	176	1,223	635	0.84	507	1,422	
Sierra	3,775		3,775	5,649	326	5,975	2,033	1.49	536	3,775	
Subtotals -	16,300	1,409	17,709	12,069	1,240	13,309	4,000	0.74	245	17,364	345
Oregon:											
Rogue River	5,101	1,356	6,457	1,077	370	1,447	105	0.21	21	6,145	312
Klamath	53	77	130	5	82	87		0.09			130
Subtotals -	5,154	1,433	6,587	1,082	452	1,534	105	0.20	20	6,145	442
Totals -	21,454	2,842	24,296	13,151	1,692	14,843	4,105	0.61	191	23,509	787



TABLE 2

SUMMARY OF RIBES ERADICATION BY THE FOREST SERVICE 1933-1951

National Forest	Acres	Man Days	Thousands of Ribes Destroyed	Ownership of Acres Covered			
				National Forest	Federal		Private
					BLM	Total	
Initial Work							
California:							
Klamath	30,312	30,911	2,878	8,874		8,874	21,438
Shasta	1,447	394	22	1,447		1,447	
Lassen	19,586	16,982	1,948	3,158		3,158	16,428
Plumas	87,831	86,392	13,722	71,242		71,242	16,589
Tahoe	4,083	1,764	549	4,083		4,083	
Eldorado	64,907	43,453	10,434	56,003		56,003	8,904
Stanislaus	63,980	37,584	11,280	56,656		56,656	7,324
Sierra	25,815	57,039	15,714	24,140		24,140	1,675
Oregon:							
Umpqua	6,320	1,228	32	5,520	800	6,320	
Rogue River	6,814	2,035	201	6,667		6,667	147
Siskiyou	10,319	5,820	211	6,275	2,118	8,393	1,926
Klamath	2,720	4,980	354	1,790	930	2,720	
Plantations	680	373	125	680		680	
Totals	324,814	288,955	57,470	246,535	3,848	250,383	74,431
Reeradication							
California:							
Klamath	18,701	13,776	474	8,954		8,954	9,747
Shasta	380	52		380		380	
Lassen	5,713	2,506	214	1,501		1,501	4,212
Plumas	116,356	61,727	7,105	70,670		70,670	45,686
Eldorado	69,176	37,695	3,109	41,588		41,588	27,588
Stanislaus	96,891	53,549	6,345	74,961		74,961	21,930
Sierra	59,387	44,027	11,994	51,012		51,012	8,375
Oregon:							
Rogue River	57,680	22,127	1,467	54,488		54,488	3,192
Siskiyou	1,661	1,092	18	666	875	1,541	120
Klamath	4,857	3,320	70	3,647	557	4,204	653
Plantations	212	228	30	212		212	
Totals	431,014	240,099	30,826	308,079	1,432	309,511	121,503
All Workings							
California:							
Klamath	49,013	44,687	3,352	17,828		17,828	31,185
Shasta	1,827	446	22	1,827		1,827	
Lassen	25,299	19,488	2,162	4,659		4,659	20,640
Plumas	204,187	148,119	20,827	141,912		141,912	62,275
Tahoe	4,083	1,764	549	4,083		4,083	
Eldorado	134,083	81,148	13,543	97,591		97,591	36,492
Stanislaus	160,871	91,133	17,625	131,617		131,617	29,254
Sierra	85,202	101,066	27,708	75,152		75,152	10,050
Oregon:							
Umpqua	6,320	1,228	32	5,520	800	6,320	
Rogue River	64,494	24,162	1,668	61,155		61,155	3,339
Siskiyou	11,980	6,912	229	6,941	2,993	9,934	2,046
Klamath	7,577	8,300	424	5,437	1,487	6,924	653
Plantations	892	601	155	892		892	
Totals	755,828	529,054	88,296	554,614	5,280	559,894	195,934

\*Includes 690 acres, 1,672 man days and 494,000 ribes on lands worked by the Forest Service now in Yosemite National Park.



## PART V

### BLISTER RUST CONTROL BY THE NATIONAL PARK SERVICE IN 1951

By

Arthur London, Operation Leader

#### ADMINISTRATION

The purpose of this cooperative project is to protect from blister rust the white pine stands having aesthetic and recreational value within the national parks. The 1951 program was planned to complete required reeradication and to continue initial ribes eradication on areas of high priority.

The Memorandum of Understanding entered into by the Departments of Agriculture and the Interior in June 1945 remained in effect during 1951. This agreement authorizes the Office of Blister Rust Control and Region 4 of the National Park Service to develop and execute control programs to accomplish the maximum benefits in the most efficient manner.

During the 1951 season blister rust eradication workers were changed from a per diem to a construction status. By the end of the summer crewmen were receiving \$1.55 per hour and crewleaders \$1.675 per hour.

#### ACCOMPLISHMENTS

During 1951 initial ribes eradication was done on 3,192 acres in Yosemite and Sequoia-Kings Canyon National Parks. Ribes eradication on areas worked previously but still requiring additional treatment was done on 26,925 acres. Table 3 of this section of the annual report summarizes the work done by each of the camps.

##### Yosemite National Park

Three blister rust control camps were in operation during the field season. Crane Flat opened late in May and Chinquapin one month later. It was the middle of July before the South Fork pack camp mustered all the men for field work. The pack camp was on a six-day week work schedule; the other two camps were on a five-day week schedule. Contractors completed 1,397 acres of reeradication work at an average bid price of \$5.02 per acre. A shortage of available contractors limited the amount of acreage worked under this procedure.

Initial eradication was completed on 878 acres and reeradication on 15,862 acres; this includes 10,562 acres found to be ribes-free at the time of post checking.

This season marked the last year for the Chinquapin camp as the ribes eradication in this camp area has been finished. Except for the area in the Chilnualna drainage no blister rust camps will be needed south of Yosemite

Valley. The control area is either on or near maintenance and any additional work can be handled by contracting or by the checker-flanker method.

At Crane Flat two large spray units operated from late May through the first week of August. Initial spray work in the Moss Creek area has been completed, although some respray work will be required for the next two years. In addition to the spray job, hand grubbing crews reworked both the mature timbered and cutover lands near Crane Flat. This camp should complete the ribes eradication in the camp area within the next two seasons.

The South Fork pack camp was late in getting started and did not complete its quota of work for 1951. However, the remaining acreage will be contracted as the camp is to be moved to a new site next year. The Base Line camp (Mather Intake) will be reactivated next year and used as a base for the pack camp as well as for ribes eradication work in the immediate vicinity.

### Recommendations

The work plan for 1952 should include the following:

1. Pine appraisal of Chilnualna and South Fork drainages east of Wawona Domo, north and east boundaries of control unit north of Merced River, and area near Lake Eleanor bordering the Stanislaus National Forest.
2. Contract the following: reeradication in Section 22, T. 4 S., R. 21 E.; area in vicinity of Aspen Valley particularly the recently logged lands; parcels of land not completed by South Fork camp last season.
3. Reopen Crane Flat, reactivate Base Line camp, and build a new pack camp.
4. Staff Crane Flat with full crew of spray and hand eradication personnel as soon as men are available.

### Sequoia-Kings Canyon National Parks

During 1951 blister rust control camps were operated at Red Fir in the Giant Forest unit, Redwood Mountain in the Grant Grove unit, and Heather Lake high-country unit. Ribes eradication began at Red Fir on June 5, at Redwood Mountain on June 15 and at Heather Lake on June 20. All camp superintendents and foremen and many of the crewmen had previous experience in blister rust control work.

The crews at Redwood Mountain continued the initial ribes eradication work in Redwood Canyon by hand digging and basal stem methods, and completed the reeradication work on 2,767 acres in the Grant Grove area, of which all but 110 acres were placed on maintenance. Camp was closed on September 2. Fifty men will again be needed in 1952 to complete the work planned for that area.

At Red Fir all initial work in the vicinity of Lost Grove was completed, and 8,009 acres of reeradication work was done in the Giant Forest unit. All but 414 acres of the 8,009 acres of reeradication now meet maintenance specifications. Camp closed on September 14. In 1952 the remaining 250 acres of initial work in the Marble Fork area will be covered and reeradication work will be continued.

On June 20 a pack camp was manned in the Heather Lake high-country unit. By August 29 the entire unit of 1,600 acres had received initial coverage by hand and chemical methods. This camp will not be needed in 1952, but parts of the unit that supported initial heavy concentrations of Ribes montigenum will need a respray job in 1953.

A ribes eradication contract program was inaugurated in the Sequoia-Kings Canyon National Park. Two sets of contractors completed treatment of 287 acres of second eradication in the Grant Grove unit. Additional contracts have been awarded for 253 acres to be completed in 1952, and more areas will be advertised for bids at that time.

### Recommendations

For 1952 the following control program is recommended:

1. The Redwood Mountain crews should continue initial work in Redwood Canyon; finish reeradication work in the Grant Grove unit and commence the reeradication work in the Redwood Mountain area.
2. At Red Fir a 50-man crew will be able to finish the initial work on the Colony Mill road and complete most of the reeradication work needed in the Giant Forest unit.
3. Development of the contract program should be continued.



# SUMMARY OF RIBES ERADICATION BY THE NATIONAL PARK SERVICE - 1951

**\* All Federal ownership.**

TABLE 2

SUMMARY OF RIBES ERADICATION BY THE  
NATIONAL PARK SERVICE 1933-1951

National Park	Acres *	Man Days	Thousands of Ribes Destroyed
Initial			
Crater Lake	3,632	412	130
Lassen Volcanic	17,779	5,754	783
Yosemite **	59,561	107,100	14,497
Sequoia-Kings Canyon	31,101	45,714	7,566
Totals	112,073	158,980	22,976
Reeradication			
Crater Lake	1,561	115	20
Lassen Volcanic	22,954	2,237	203
Yosemite ***	83,108	64,207	5,636
Sequoia-Kings Canyon	33,145	11,416	827
Totals	140,768	77,975	6,686
All Workings			
Crater Lake	5,193	527	150
Lassen Volcanic	40,733	7,991	986
Yosemite	142,669	171,307	20,134
Sequoia-Kings Canyon	64,246	57,130	8,393
Totals	252,841	236,955	29,663

\* All Federal ownership.

\*\* In addition 8,206 acres, 5,577 man days and 1,712,000 ribes on lands worked by the Forest Service and the Bureau of Entomology and Plant Quarantine are now in Yosemite National Park.

\*\*\* In addition 480 acres, 326 man days, and 299,000 ribes on lands worked by the Bureau of Entomology and Plant Quarantine are now in Yosemite National Park.

TABLE 3

## SUMMARY OF PARK SERVICE WORK BY CAMP - 1951

Camp	Size of Camp	Total Acres Covered	Total Man Days	Thousands of Ribes Destroyed
Yosemite National Park				
Chinquapin	50	4,771	1,899	85
Crane Flat	50	9,992	2,488	927
South Fork	30	580	980	100
Contract	-	1,397	383	25
Totals	-	16,740	5,750	1,137
Sequoia-Kings Canyon National Parks				
Redwood Mountain	50	3,311	2,093	296
Red Fir	50	8,179	2,777	296
Heather Lake	20	1,600	882	143
Contract	-	287	230	32
Totals	-	13,377	5,982	767
All National Parks				
Eradication (Camp)	-	28,433	11,119	1,847
Contract Work	-	1,684	613	57
Totals	-	30,117	11,732	1,904

## PART VI

### BLISTER RUST CONTROL BY THE BUREAU OF LAND MANAGEMENT IN 1951

By

Homer R. Bryan, Operation Leader

#### ADMINISTRATION

The purpose of this project is to protect from damage by blister rust selected stands of white and sugar pine on public lands administered by the Bureau of Land Management.

The Bureau of Land Management and the Bureau of Entomology and Plant Quarantine cooperate in the operation of this project. A memorandum of understanding outlining the responsibilities of each agency was initiated in 1945 and continued in force through 1950. Technological advances and modifications of methods and procedures made a review of the memorandum of understanding advisable, and a revision clarifying the responsibilities of each was signed into effect in 1951. Briefly, administration continued to be a function of the managing agency, and the control specialists continued to furnish technical direction, coordination, and leadership. Specifically, special control jobs, checking, and other technical investigations were handled by Homer R. Bryan of the Bureau of Entomology and Plant Quarantine. All other phases of control, pine appraisal, and administration were directed by Robert C. Warnock of the Bureau of Land Management. An administrative headquarters and a warehouse for service of supplies and equipment were maintained by the Bureau of Land Management at Medford, Oregon.

#### ACCOMPLISHMENTS

##### Eradication

###### Contract

Eradication contracts were completed on 2,774 acres during the 1951 season and payments to contractors totaled \$20,279. All treatment was initial.

##### SUMMARY OF CONTRACTS AWARDED, CANCELLED, COMPLETED AND CARRIED OVER

Carried Over From 1950 Season	Awarded During 1950 Season	Total	Cancelled	Completed During 1951 Season	Carried Over 1952 Season
6	13	19	4	10	5

Four contracts were cancelled during the 1951 season. One contractor failed to begin work within specified time limits. Another bidder failed

to inspect the area before bidding and subsequently defaulted. The other contracts were cancelled because of continued unsatisfactory work and failure to meet completion deadlines. One cancelled contract was completed with force-account labor, another was readvertised and completed later in the season, and the remaining two will be readvertised early in 1952.

Additional problems included the application of restrictive clauses against two contractors because of unsatisfactory work performance, and failure to receive acceptable bids on one invitation. However, this invitation was readvertised at a later date, satisfactory bids received, and a contract awarded.

Despite the above difficulties, the contract program functioned more satisfactorily than in previous years. In 1951 invitations to bid were prepared and issued at the field level as required instead of at the Portland Regional Office. The increased flexibility simplified and expedited contract procedure.

### Force Account

A young and relatively inexperienced crew of 12 men began work at Trappers Cabin in June. Initial treatment on 608 acres was accomplished within the unit. Results were better than anticipated. In addition, the crew sprayed 360 acres of Ribes bracteosum along streams in the buffer zones around the Trappers Cabin and Bunker Hill-Chrome Ridge units. This necessitated carrying equipment and supplies into remote areas where the brush and terrain made progress slow and extremely difficult. The crew was well supervised, had excellent morale, and did an effective spray job.

### Checker-Flanker

At the beginning of the 1951 season the following conditions prevailed in the Selma unit.

1. Rust had been present for at least 10 years and a very close association existed between rust on pines and the presence of ribes.
2. The unit had received two eradication treatments and the area was either on or near maintenance. (Maintenance is the condition where ribes populations are reduced to a point where further damaging infection is prevented and where this condition will continue until upset by forest disturbances.)
3. Complete records of conditions existent at the time of previous treatments were available. However, locating the last few scattered ribes necessary to convert a "near-maintenance" area to maintenance requires considerably more time than the actual eradication of those bushes.

A modified system of treatment (checker-flanker) was devised to meet the above conditions, and this method was recommended

to and approved for use by the Bureau of Land Management. A crew of checkers experimentally treated 1,609 acres of "near-maintenance" area with checker-flanker teams. Briefly, those teams functioned as follows:

A checker-chief-of-party ran a normal ribes check strip. In addition he examined sugar pine reproduction for blister rust infections, and recorded and plotted data.

One flanker on each side of the checker ranged over a strip 1-1/2 to 2-1/2 chains wide, searched for ribes, examined sugar pine reproduction for infections, and reported his findings to the checker.

The team destroyed scattered ribes as encountered. Adjacent areas were systematically searched for concentrations. These were either eradicated or, if extensive, carefully mapped and deferred for follow-up treatment by contract or force-account labor.

Sampling of sugar pine reproduction was intensified when a post-eradication infection was encountered; any rust build-up necessitated a thorough systematic search of adjacent areas until the source of infection was discovered.

Preliminary analysis of data indicates that the checker-flanker method has considerable merit when properly used. Apparent advantages are:

1. The addition of two flankers more than tripled the percentage of ribes sample obtained by the checker alone. The flankers used neither compass nor pacing and were able to search more area than the checker.
2. Checking and eradication were a combined function on most of the area worked.
3. Recent infections indicated the presence of ribes where the normal search sometimes failed.
4. Rust hazard was clearly indicated by rust incidence.
5. Data indicated the degree of stocking of sugar pine reproduction on very small areas.
6. The combined ribes-pine-rust-disturbance pattern gave an excellent indication of future work requirements for the area.
7. One effective checker with the "know-how" can quickly train and utilize two relatively inexperienced flankers.



## Checking

Two men began advance checking the Selma extension in early April. A small camp for seven checkers was established at the old eradication camp site in Swede Basin on April 17. Post checking of this unit was completed in July and the camp was moved to Reeves Creek in the southern part of the Selma unit. The advance check of the Selma extension was completed and the remainder of the season was spent on post checking and checker-flanker work in the Selma unit. In addition, the crew regular checked 4,428 acres of contract and force-account work in the Trappers Cabin and West Galice areas. To render prompt checks without incurring excessive travel time required detailed but flexible planning on the part of the checking personnel. Checking remote areas necessitated packing in and camping on the job. Checking was discontinued on the Bureau of Land Management project on September 14.

A summary of results is contained in Table 10.

## Delineation of Units

The Bureau of Land Management conducted pine appraisal work on approximately 3,500 acres in the East Galice and Swede Basin areas. The economic justification formula developed by the Bureau of Land Management is being used to determine whether any stands qualify for sugar pine management.

A complete inventory of area by ownership within blister rust control units on the Bureau of Land Management project was completed by Mr. Warnock early in 1951.

The Selma unit contained 21,748 acres of private and county lands intermingled with 11,920 acres of federally administered land. To protect sugar pine on federal lands the entire unit had received two eradication treatments. By 1951 rust behavior studies in the unit had progressed to a point where a limited application of local control to the Selma unit was recommended to the Bureau of Land Management. The recommendation was accepted and applied by them. Since the Bureau of Land Management wishes to restrict its protective work as much as possible to land under its administration, all private and county lands were deleted from the unit. However, if protection of pine on the remaining federal lands is to be accomplished, it may be necessary to continue treatment of some private and county lands as buffer strips.

## RECOMMENDATIONS

The following recommendations are made for the 1952 field season:

1. Complete the initial treatment of the Trappers Cabin and Evans Creek units by the contract procedure.
2. Exploit the flexibility of the checker-flanker method of eradication on areas of light ribes population in the Swede Basin, Selma, and Old Glory units and get as much of these units as possible on maintenance.

3. Contract areas of extensive ribes concentrations and other areas not suitable for checker-flanker treatment.
4. Use the checker-flanker method in beginning reeradication treatment of the Quartz Creek unit.
5. Contract for initial treatment of the Hungry Hill unit if feasible.
6. Complete pine appraisal of areas under consideration for sugar pine management.
7. Examine blocks of federally administered land remaining in the Selma unit and delineate the portions that are to be managed for sugar pine. Most of these blocks are on or near maintenance and ecological conditions are static. The adjoining privately owned land will be subject to disturbance as long as present timber markets exist. Buffer strips on these privately owned lands must be examined periodically and possibly treated to protect the pine on the adjacent federal lands. Sugar pine stocking on some of the federal lands may not justify the continued protection.

TABLE 1

## SUMMARY OF RIBES ERADICATION BY THE BUREAU OF LAND MANAGEMENT - 1951

Control Operation	Acres		Man Days		Thousands of Ribes Destroyed	Per Worked Acre		Ownership of Acres Covered						
	Checked and Meeting Standards Without Work	Total	Eradication	Check- ing		Eradication Man Days	Ribes	Federal		State				
								Nat. Forest	BLM					
											Total Private			
Initial														
Medford	3,362	5,629	9,011	1,508	196	1,704	101	0.45	30	2,298	4,821	7,119	1,255	637
Reeradication														
Medford	1,609	-	1,609	66	329	395	1	0.41	1	-	1,609	1,609	-	-
All Workings														
Medford	4,991	5,629	10,620	1,574	525	2,099	102	0.31	20	2,298	6,430	8,728	1,255	637

TABLE 2

## SUMMARY OF RIBES ERADICATION BY THE BUREAU OF LAND MANAGEMENT 1940-1951

Control Operation	Acres	Man Days	Thousands of Ribes Destroyed	Ownership of Acres Covered				
				Federal		State		
				National Forest	BLM	Private	State	
				Initial				
Medford	63,123	17,619	1,060	20,375	28,873	49,248	13,238	637
McKinley (Nursery Sanitation)	150	273	8	-	110	110	40	-
Totals	62,273	17,892	1,068	20,375	28,983	49,358	13,278	637
Reeradication								
Medford	33,624	10,900	334	9,932	16,084	26,016	7,608	-
All Workings								
Medford	96,747	28,519	1,394	30,307	44,957	75,264	20,846	637
McKinley (Nursery Sanitation)	150	273	8	-	110	110	40	-
Totals	96,897	28,792	1,402	30,307	45,067	75,374	20,886	637



## DEVELOPMENT AND IMPROVEMENT OF CONTROL METHODS

## IN THE PACIFIC COAST PROJECT FOR 1951

By

C. R. Quick, Forest Ecologist, and W. S. Burrill, (Agent) Forest Ecologist

## SECTION I. HIGHLIGHTS OF THE YEAR 1951

Reorganization of the Bureau of Entomology and Plant Quarantine on a regional basis in June 1951, placed the Development and Improvement Project, H. R. Offord, Project Leader, in the Western Region (Region IV) of the Bureau, under W. V. Benedict, Regional Director. Late in 1951 the development and improvement of methods for disease survey and scouting, disease studies relating to the status of control, and Bureau responsibilities for cooperative work on the development of rust-resistant sugar pine were transferred to the D&I Project as work assignments of D. R. Miller.

Chemical Methods.

A series of defoliation tests involving very dilute aqueous spray formulations of herbicides (25 to 100 ppm), was started in 1950 and continued in 1951. Some plots sprayed with 2,4-D at concentrations as low as 50 ppm showed major damage to the gooseberries. In fact, because of this major damage, some series of plots started in 1950 had to be discontinued in 1951 and started over with more dilute formulations. These defoliation tests show a marked seasonal effect similar to that of the conventional dilute-aqueous sprays.

Clearing a way duff and debris from ribes crowns and the scuffing and partial debarking of crowns and stem-bases to be treated by the basal-stem method is known as scarification. The 1950 basal-stem tests on Ribes roezli showed 90.5 percent bush kill for all scarified plots, and 83.9 percent for all tests. in the case of R. cereum, results from scarified plots were 11 percent lower than the general average.

Results from basal-stem treatments of R. roezli in June were generally better than those from late-season tests. Thus, basal-stem treatments tend to exhibit the seasonal effect that is important in dilute-aqueous tests, but not in so marked a degree. Results from basal-stem treatments on R. nevadense continue better than on R. roezli. The conditions, formulations and dosages for basal-stem treatment of R. cereum need more precise definition before consistently satisfactory results will be obtained in operations work.

All 1951 basal-stem treatments were applied with a back-pack dual-tank compressed-air unit equipped with the usual hose and extension rod, and a fan-spray nozzle. This type of unit may prove to be practical for operations work. Drawings of the essential features of this shop-built



unit have been prepared.

The average results from 1950 tests are compared in table 1 with results from tests prior to 1950.

One development that may improve the kill of all ribes by basal-stem method is the use of a bright oil-soluble color as a marker. Of several materials and dosages tested in the field during 1951 a bright scarlet dye (National Aniline Co., Red Oil Soluble O) proved to be the most visible and light-fast. This dye is added to the 5 percent oil-ester concentrate at the rate of one tablespoonful of powder per gallon of toxicant.

A promising new field for experimentation was found in the application of volatile esters of 2,4-D in dry formulations, with a resulting defoliation of *R. roezli* by the herbicidal vapors. Arrangements have been made with a commercial formulator to furnish test quantities of a pelletized ester of 2,4-D that would be suitable for broadcast application from fixed-wing aircraft. Pellets will be heavy enough to sift down through trees and brush.

During 1951 a total of 141 basal-stem tests, 122 conventional aqueous spray tests, and 39 defoliation spray tests were made in California and Oregon. (See table 2.)

#### Ribes Ecology.

All major ecologic studies were continued. Growth of ribes live-stem and occurrence of ribes seedlings seem to be on the increase. The above-average rainfall of the 1951-52 season also indicates a reversal of trends due to the recent series of dry years. If this indication of trend is correct, seedling occurrence and ribes growth can be expected to cause more trouble in the immediate future than in the recent past.

The 4 grazing-exclosure plots, initiated in 1940, are nearing the end of greatest usefulness. A comprehensive summary of such maturing portions of the ecology program will be started as soon as higher priority jobs will permit.

The sugar-pine logging and regeneration study on the Dodge Ridge Tract, Stanislaus N.F., has developed according to plans of the California Forest and Range Expt. Station. Station personnel (Division of Forest Management Research) has spent a great deal of effort on the experimentally logged portions of the tract, and data resulting from a wide variety of plots and studies should do much to define the most favorable conditions for sugar pine regeneration. Early spring inspection of the 1948-logged areas of the Dodge Ridge Tract showed that a considerable number of 1949-origin gooseberries would fruit in 1951. These areas were delimited, and the ribes thereon were eradicated by a thoroughly experienced contractor in early summer, before seed had a chance to mature.

The locality of the 9 square-chain brush plots near Fahy Meadow (Stanislaus N.F.) was completely burned by the Wright's Creek Fire of Labor Day, 1950. The area was visited in June 1951. The brush plots were all within the burned area subsequently prepared for planting, and all but small portions of 3 plots had been thoroughly cultivated by the big notched discs used in the preparation for planting. The plot series was abandoned.

Sugar-pine inventory was taken in 1951 on the 8 ribes-regeneration plots. Sugar-pine crop trees on these widely scattered one-acre plots varied from no crop trees per acre to 24 crop trees, and averaged 10.5 crop trees per acre. About 9 percent of all sugar pines on the plots were classed as crop trees, and 54.4 percent as suppressed. Of the 70 dominant sugar pines, which could not be classified as crop trees, 61.4 percent (43 trees) were graded down because of competition with mature trees, and 38.6 percent (27 trees) because of young growth.

The Fanianni Area one-acre plot (lightly logged in 1942) and the Shaver Timber plot (heavily logged in 1941) are currently providing important data because no ribes have been permitted to fruit on these plots since logging. Seedling regeneration on these plots is due to germination of ribes seed which predates the logging. Ribes regeneration on the Fanianni Area (Sec. 12, T27N, R6E, Lassen N.F.) has practically ceased, but 323 current-season seedlings were counted in July 1951 on the Shaver Timber plot (Sec. 13, T10S, R25E, Sierra N.F.)

## SECTION II. DEVELOPMENT OF IMPROVED HERBICIDES FOR RIBES ERADICATION WORK.

### RESULTS OF 1950 FIELD WORK

The 426 experimental chemical plots established in 1950 were inspected in 1951. The earliest of the scheduled seasonal tests of 1950 were put out on the Lassen N.F. on June 1, at a time when large patches of snow were common: the latest plots were started on August 17 on the Plumas N.F. Two additional plots were established on the Eldorado N.F. on the last day of September. Three species, Ribes roezli, R. cereum, and R. nevadense, were treated in 1950. Three methods of application were used: (1) conventional (dilute-aqueous) sprays, (2) defoliation (very dilute aqueous) sprays, and (3) basal-stem treatments. Defoliation tests started in 1950 were continued through 1951, with some modifications to the original schedule. Summaries of data from 108 plots of dilute-spray tests, applied in 1950 at active and at past-active stages of plant growth, show a mean-bush kill of 75 percent for R. roezli (table 3) and of 93 percent for R. nevadense (table 4). Summaries from 118 plots of basal-stem tests show a mean bush kill of 84 percent for R. roezli (table 5), of 94 percent for R. nevadense (table 6), and of 52 percent clump kill for R. cereum (table 7).

#### Dilute Spray Tests.

About 2,860 R. roezli plants were treated in 1950 on the 108 dilute-spray test plots on the Plumas and Sierra National Forests (see table 3). Sprays used on the Plumas had 2,4,5-T added to the basic 2,4-D formulations. Additive materials included in some of the spray mixes were: Sticker-spreader, Nonic, Tween #20, Tergitol #7, and fl-wable medium summer oil. Of the several groups of plots established in different localities and at different stages of plant growth, June applications on the Plumas resulted in the best kill (89 percent). Mean percent bush kill on the 100-ppm group of plots was 59.5 compared with the mean of 74.8 percent for all bushes treated (table 3). No plot of the 100-ppm group resulted in 100 percent kill, but 5 out of 31 plots of the 2,000-ppm group showed 100 percent kill.

Some 276 R. nevadense bushes (table 4) were included in the dilute-aqueous tests on R. roezli. About 30 percent of the test plots in the 100-ppm group showed kills of 50 percent or less on R. nevadense; at 2,000 ppm there were no kills of current bushes below 90 percent.

#### Defoliation Tests.

Table 8 summarizes results from 1950 defoliation tests. Bush defoliation was good in most tests involving 2,4-D. Where either a high bush kill, or a poor defoliation was obtained from 1950 treatments, the series of plots concerned was discontinued in 1951. Most effective defoliation and damage was obtained on the southern form of R. roezli (Sierra N.F.) by applications at active growth stage in mid-June. Nevertheless, 50 ppm 2,4-D on the south Sierra, and 25 ppm 2,4-D plus 25 ppm 2,4,5-T on the north Sierra produced major damage.

## Basal Stem Tests.

Experimental basal-stem treatments in 1950 mainly concerned new formulations, and lower concentrations of chemicals than were previously used. Test solutions contained 5, 2.5, or 1 percent acid equivalent by weight of 2,4-D or 2,4,5-T, instead of the 20, 10, and 5 percent formulations of previous years. Most tests were made with Diesel oil as a diluent; a few with kerosene. Species included in the tests were R. roezli, R. nevadense, and R. cereum. Chemicals and combinations included: (1) isopropyl ester of 2,4-D, (2) isopropyl ester of 2,4,5-T, (3) a 50-50 mixture of these two esters, (4) isopropyl ester of 2,4-D with pentachlorophenol, (5) 2,4-D oil-soluble amine (ACP #897), (6) a mixture of 2 parts 2,4-D and 1 part 2,4,5-T as emulsifiable acid (ACP #926), (7) 2,4,5-T as emulsifiable acid (ACP #953), and (8) Himel's X-11-1 Brushkiller.

Most of the 118 basal-stem plots, which supported some 1,600 R. roezli plants, were located along Davis Road, across Fall River from Camel Peak, Plumas N.F. Mean bush kill for all gooseberries treated with standard volumes of solution was 84 percent (table 5). About half of the plots showed 100 percent bush kill. Conditions which produced better-than-average results include: (1) scarifying the stems before basal treatment (91 percent bush kill), (2) treating with formulations of 5 percent acid equivalent, the highest concentration used in 1950 (90 percent bush kill), and (3) treating in early season, that is, treatments made during June (97 percent bush kill).

Basal-stem treatments of R. nevadense continue to show satisfactory kill of bushes (90 to 100 percent) with all standard formulations and dosages at the tested concentrations of 5,  $2\frac{1}{2}$ , and 1 percent. (See table 6.) Isopropyl ester of 2,4-D with additions of pentachlorophenol gave poor results on R. nevadense; three of 20 plots so treated showed no bush kill.

Basal-stem treatments were applied to a total of 651 bush clumps of R. cereum on the Lassen and Sequoia Forests. Tops of exposed crowns, and 6 to 8 inches of basal stems, were wet with the oil-diluted herbicides. Bushes on about a third of the plots were scarified. About one-half of all treated bush clumps were killed. More than a third of the plots showed sprouts on some part of all clumps (table 7). Significant differences in results were noted on the Lassen and Sequoia plots although comparable tests were made in the two areas. Only one-third of the bush clumps on the Lassen were dead; and half of the plots showed no clumps killed. In comparison, two-thirds of the bush clumps on the Sequoia were killed, and only one-eighth of the plots showed no bush clumps killed.

## Other 1950 Work.

Operations men in 1950 experimentally applied 4 basal-stem tests (3 on the Sierra and 1 on the Plumas) and 8 foliage-spray tests (6 on the Sierra and 2 on the Plumas). These tests were large-scale plots designed to expedite our understanding of the cost and effectiveness of basal-stem work done by regular crews. Results from these large-scale plots were comparable to those from small experimental plots. Several small explore-

tory or range-finding tests, not otherwise reported, were also initiated in 1950.

#### Re-check of 1949 Work.

Tests on Ribes montigenum, sprayed conventionally with 2000 to 4000 ppm 2,4,5-T plus summer oil, and with 1200 to 4000 ppm of 2,4-D and 2,4,5-T in combination without the summer oil, resulted in bush kills of 83 to 93 percent. Low volume spray treatments made with 4.3 percent 2,4,5-T applied with Hi-fog gun resulted in comparable kills.

Many of the dormant-spray tests on Park Creek (Eldorado N.F.), applied to R. roezli in October 1949, showed more complete kill in 1951 than in 1950. This indicates a delayed killing action of the herbicides tested.

#### CHEMICAL TESTS OF 1951

Further studies were made during 1951 of basal-stem treatments, conventional dilute-aqueous sprays, and defoliation-spray treatments of ribes. Most tests were made on Ribes roezli, in the active and the past-active stages of plant growth, on the Sierra and Plumas National Forests. The 302 experimental chemical plots of 1951 are classified in table 2 with respect to plot location, species of ribes, type of test, and month of application.

All basal-stem treatments of 1951 were applied with a dual-tank back-pack compressed-air sprayer equipped with a fan nozzle (Spraying Systems, "tee Jet 500050"). Air pressures of 15 to 30 pounds were obtained in the unit by transfer of air from a compressor mounted on a pickup truck. Concentrations of herbicide of 1, 2.5, and 5 percent acid equivalent by weight were used. Formulations contained 2,4-D esters alone, 2,4,5-T esters alone, and mixtures of 1 part 2,4-D esters with 2 parts 2,4,5-T esters. Formulations of isopropyl (high volatility) esters and butoxyethanol (low volatility) esters were compared in parallel series of tests. New commercial formulations were compared with the mixed 2,4-D and 2,4,5-T ester formulations. Comparative effectiveness of basal-stem treatments versus dilute aqueous sprays was tested on ribes in heavy brush. Other basal-stem tests involved varying the length of treated portions of canes and varying the volume of solution per bush.

Dilute spray treatments were applied with a small spray rig--a Hurst pump driven by a Wisconsin gasoline engine--mounted on a pickup truck. Pressures of 125 to 200 pounds at the pump were commonly used. Hose lengths up to 200 feet were required to treat some of the plots. Half-square-rod plots were sprayed with a solid cone nozzle (Spraying Systems, #2 1/2 orifice) at a uniform rate of 10 gallons per square rod. Concentrations of 125 to 2000 ppm acid equivalent by weight were used; all formulations contained 1 percent flowable medium summer oil. Three concentrations of each of the two esters of 2,4-D (isopropyl and butoxyethanol) were separately applied on the Sierra. Constant-proportion mixtures (1 part 2,4-D plus 2 parts 2,4,5-T) of the same two esters were similarly applied on the Plumas. Treatments with triethanolamine salt

of 2,4-D and with monohydrate sodium salt of 2,4-D at 500 ppm were compared. Late season tests on the Sierra were made at 500 ppm of monohydrate sodium salt of 2,4-D, with and without additions of propylene glycol to the spray solutions.

Several new commercial formulations were compared with the old, more-or-less standard formulations. Some noteworthy chemicals and formulations are (1) MCP-BOEE (2-methyl-4-chlorophenoxyacetic acid, as the butoxyethanol ester) and (2) ACP #977, the butoxyethanol esters of 2,4-D and 2,4,5-T commercially formulated with sufficient emulsifier to permit the use of 10 gallons of Diesel oil in 100 gallons of aqueous spray solution at commonly-used concentrations of herbicide.

Defoliation tests were applied with the same equipment as that used for the conventional dilute-aqueous tests. Defoliation plots were sprayed with concentrations of 25 to 100 ppm at the uniform rate of five gallons per square rod. These tests were primarily a continuation of the series started in 1950, with two modifications. Plots on which high percentages of kill resulted from 1950 spraying were not resprayed in 1951. Instead, comparable new plots were started with one-half the original concentrations. The formulation containing 100 ppm NAENDO (disodium 3,6-endoxohexahydrophthalate) gave poor defoliation in all 1950 tests, and the series was discontinued. The defoliation tests are summarized in table 8.



Table 1. Effectiveness of 2,4-D and 2,4,5-T on R. roezli and R. nevadense.  
Average results from 1950 and accumulated data from 1946-49.

State of plant growth	Age class of bushes	Percent of bush kill					
		2,4-D		2,4,5-T		2,4-D plus 2,4,5-T	
		1946-49	1950	1946-49	1950	1946-49	1950
Dilute-aqueous sprays on <u>R. roezli</u>							
Active	Old	92	85	93	--	92	--
	Young	91	--	93	--	92	95
Past	Old	58	69	48	--	84	--
Active	Young	51	--	64	--	91	67
Basal-stem treatments on <u>R. roezli</u>							
Active	Old	96	100	98	100	95	--
	Young	--	100	--	100	--	100
Past	Old	80	73	84	--	93	--
active	Young	70	90	--	88	--	86
Basal-stem treatments on <u>R. nevadense</u>							
Active	Old	100	93	--	--	--	--
	Young	100	--	--	--	--	--
Past	Old	85	99	100	--	100	--
active	Young	--	100	--	--	--	--
Dilute-aqueous sprays on <u>R. nevadense</u>							
Active	Old	100	98	--	--	100	--
	Young	100	--	--	--	100	100
Past	Old	70	91	--	--	100	--
active	Young	87	--	--	--	100	90

Table 2. Summary of experimental chemical tests applied to ribes in 1951.

Type of test	Forest location	Number of test plots, by species of ribes and month of application*										Plot totals **
		Ribes roezli					Ribes nevadense**					
		May	June	July	Aug.	Sept.	May	June	July	Aug.	Sept.	
Basal-stem treatments	Plumas	--	26	--	35	--	--	10	--	9	--	61
	Sierra	5	23	--	35	10	1	11	--	7	1	73
	Sequoia	--	--	6	--	--	--	--	2	--	--	6
	Totals	5	49	*6	70	10	1	21	2	16	1	140
Dilute aqueous sprays	Plumas	--	15	--	30	--	--	4	--	5	--	45
	Sierra	7	21	10	39	--	1	3	--	18	--	77
	Totals	7	36	10	69	--	1	7	--	23	--	122
Defoliation sprays	Plumas	--	10	--	10	--	--	2	--	1	--	20
	Sierra	--	8	--	11	--	--	--	--	1	--	19
	Totals	--	18	--	21	--	--	2	--	2	--	39
Grand totals		12	103	16	160	10	2	30	2	41	1	301

\*One basal-stem treatment was applied in July to Ribes cereum on the Rogue River N.F.

\*\*All Ribes nevadense plants were treated on plots with the R. roezli; no separate R. nevadense plots were established.

Table 3. Comparison of bush kill resulting from 1950 dilute-spray tests on Ribes roezli\*

Groups of plots	Number of ribes plants		Mean per-cent of kill	Number of plots		
	Treated	Dead in 1951		In group of tests	With 100% bush kill	Under 50% bush kill
6/5-9....Plumas	488	436	89.3	21	7	1
6/14-19...Sierra	478	366	76.6	21	5	3
7/10-13...Plumas	236	147	62.3	21	0	7
7/21-26...Sierra	1181	865	73.2	22	0	1
8/14-17...Plumas	480	327	68.1	23	0	4
Plumas.....	1204	910	75.6	65	7	12
Sierra.....	1659	1231	74.2	43	5	4
<u>TWEEN IN 2,4-D</u>						
0.04% 100 ppm	93	59	63.4	5	0	2
0.10% " "	96	50	52.1	5	0	2
0.50% " "	75	48	64.0	5	0	1
Subtotals: 100 ppm	264	157	59.5	15	0	5
0.04% 500 ppm	178	137	77.0	5	1	0
0.10% " "	142	99	69.7	5	2	0
0.50% " "	152	109	71.7	5	1	1
Subtotals: 500 ppm	472	345	73.1	15	4	1
Other 500 ppm	1358	1038	76.4	47	3	6
0.04% 2000 ppm	117	100	85.5	5	2	0
0.10% " "	124	95	76.6	5	1	1
0.50% " "	142	103	72.5	5	1	1
Subtotals: 2000 ppm	383	298	77.8	15	4	2
Other 2000 ppm	386	303	78.5	16	1	2
<u>WITH ADDED</u>						
Tergitol	132	103	78.0	5	1	0
Nonic	108	78	72.2	5	0	0
Tween	1119	800	71.5	45	8	8
Subtotals	1359	981	72.2	55	9	8
SO + Nonic	153	126	82.4	5	1	0
SO + Tween	158	128	81.0	5	0	0
SO + DuSS	171	117	68.4	6	1	1
SO	165	113	68.5	5	0	2
Subtotals	647	484	74.8	21	2	3
ACP 638	316	272	86.1	10	1	0
ACP 648	248	197	79.4	10	0	2
X-11-1	39	30	76.9	2	0	0
ACP 926	254	177	69.7	10	0	3
Subtotals	857	676	78.9	32	1	5
All tests	2863	2141	74.8	108	12	16

\*In general all plots on the Sierra N.F. were treated with formulations of 2,4-D; and those on the Plumas N.F. with formulations containing 1 part 2,4-D plus 2 parts 2,4,5-T.

Table 4. Comparison of mean results from 1950 dilute-spray tests on Ribes nevadense\*.

Groups of plots	Number of ribes plants		Mean per- cent kill	Number of plots		
	Treated	Dead in 1951		In group of tests	With 100% bush kill	Under 50% bush kill
6/5.....Plumas	30	30	100.0	7	7	0
6/14-19..Sierra	79	77	97.5	13	11	0
7/10-13..Plumas	19	17	89.5	10	8	2
7/21-26..Sierra	93	86	92.5	15	8	1
8/14-17..Plumas	55	47	85.5	18	12	3
Plumas.....	104	94	90.4	35	27	5
Sierra.....	172	163	94.8	28	19	1
TWEEN IN 2,4-D						
C.4% 100 ppm	13	9	69.2	4	2	2
C.1% " "	10	8	80.0	4	2	1
C.5% " "	6	5	83.3	2	1	0
Subtotals: 100 ppm	29	22	75.9	10	5	3
C.4% 500 ppm	2	2	100.0	1	1	0
C.1% " "	7	7	100.0	3	3	0
C.5% " "	7	6	85.7	3	2	1
Subtotals: 500 ppm	16	15	93.8	7	6	1
Other 500 ppm	164	157	95.7	30	23	1
C.4% 2000 ppm	16	15	93.8	2	1	0
C.1% " "	3	3	100.0	2	2	0
C.5% " "	2	2	100.0	1	1	0
Subtotals: 2000 ppm	21	20	95.2	5	4	0
Other 2000 ppm	46	43	93.5	11	8	1
WITH ADDED						
Tergitol	20	19	95.0	3	2	0
Nonic	17	16	94.1	2	1	0
Tween	66	57	86.4	22	15	4
Subtotals	103	92	89.3	27	18	4
SO + Nonic	11	11	100.0	3	3	0
SO + Tween	15	14	93.3	3	2	1
SO + DuSS	34	31	91.2	4	1	0
SO	9	9	100.0	2	2	0
Subtotals	69	65	94.2	12	8	1
ACP 638	31	30	96.8	7	6	0
ACP 648	31	30	96.8	7	6	1
X-11-1	9	8	88.9	2	1	0
ACP 926	33	32	97.0	8	7	0
Subtotals	104	100	96.2	24	20	1
...All tests.....	276	257	93.1	63	46	6

\*In general, all plots on the Sierra N.F. were treated with formulations of 2,4-D, and on the Plumas N.F., with formulations containing 1 part 2,4-D plus 2 parts 2,4,5-T.

Table 5. Comparison of bush kill resulting from 1950 basal-stem tests on Ribes roezlii.

Groups of plots	Number of ribes plants		Mean per- cent kill	Number of plots		
	Treated	Dead 1951		In tests	All bushes killed	No bushes killed
6/3.....Lassen	1	1	100.0	1	1	0
6/5-9....Plumas	311	309	99.4	25	24	0
6/14.....Sierra	29	25	86.2	5	3	0
6/27-29..Sequoia	5	2	40.0	4	2	2
June totals †	322	313	97.2	33	28	2
7/7-8....Lassen	12	7	58.3	8	4	2
7/10-13..Plumas	416	335	80.5	27	7	0
7/18.....Sierra	3	3	100.0	2	2	0
7/30.....Sequoia	1	1	100.0	1	1	0
July totals	432	345	79.9	38	14	2
8/9-11...Lassen	19	11	57.9	9	3	3
8/14-17..Plumas	717	580	80.9	34	10	0
August totals ‡	676	522	81.7	42	13	3
9/30.....Eldorado*	85	67	78.8	2	1	0
Sierra. ....	32	28	87.5	7	5	0
Plumas † ‡	1360	1161	85.4	83	39	0
Lassen.....	32	19	59.4	18	8	5
Sequoia.....	6	3	50.0	5	3	2
D-IPE ‡	305	279	91.5	28	18	1
T-IPE	238	214	89.9	20	13	1
D-IPE + T-IPE	258	230	89.1	18	10	0
D-IPE + PCP	219	183	83.6	21	9	2
Subtotals ‡	1020	906	88.8	87	50	4
ACP 897	169	136	80.5	8	3	0
X-11-1	64	50	78.1	6	0	2
ACP 926	113	76	67.3	9	2	1
ACP 953	64	43	67.2	3	0	0
Subtotals	410	305	74.4	26	5	3
5.0 percent	459	414	90.2	38	23	1
2.5 percent	454	378	83.3	34	14	1
1.0 percent	517	419	81.0	41	18	5
scarified tests	368	333	90.5	31	22	0
All tests	1599	1341	83.9	118	58	7

\*Data from these two very late-season plots on the Eldorado are omitted from rest of table.

‡ Data from a very low-volume treatment on one plot on the Plumas were deleted.

‡ Data from two unsatisfactory oil-formulations were deleted (ACP 638 and ACP 648).

Table 6. Comparison of bush kill resulting from 1950 basal-stem tests on Ribes nevadense.

Groups of plots	Number of ribes plants		Mean per- cent kill	Number of plots		
	Treated	Dead 1951		In tests	All bushes killed	No bushes killed
6/3.....Lassen	33	33	100.0	9	9	0
6/5-9.....Plumas	3	3	100.0	3	3	0
6/14.....Sierra	114	106	93.0	9	7	0
June totals	150	142	94.7	21	19	0
7/7.....Lassen	59	56	94.9	9	7	0
7/10-13...Plumas	3	3	100.0	2	2	0
7/18.....Sierra	29	26	90.0	9	6	2
July totals	91	85	93.4	20	15	2
8/11.....Lassen	45	43	95.6	9	7	0
8/14-17...Plumas	48	43	89.6	12	10	2
August totals	93	86	92.5	21	17	2
Lassen.....	137	132	96.4	27	23	0
Plumas.....	54	49	90.7	17	15	2
Sierra.....	143	132	92.3	18	13	2
D-IPE + T-IPE	4	4	100.0	1	1	0
T-IPE	2	2	100.0	2	2	0
D-IPE	208	200	96.2	33	31	0
D-IPE + PCF	88	76	86.4	20	12	3
Subtotals	302	282	93.4	56	46	3
ACP 897	20	20	100.0	1	1	0
ACP 926	3	3	100.0	2	2	0
X-11-1	1	1	100.0	1	1	0
ACP 953	8	7	87.5	2	1	1
Subtotals	32	31	96.9	6	5	1
5.0 percent	95	93	97.9	19	17	1
2.5 percent	93	85	91.4	22	18	3
1.0 percent	146	135	92.5	21	16	0
Sacrificed tests	94	93	98.9	19	18	0
All tests	334	313	93.7	62	51	4



Table 7. Comparison of clump kill resulting from 1950 basal-stem tests on Ribes cereum.

Groups of plots	Number of ribes clumps		Mean per- cent kill	Number of plots		
	Treated	Dead 1951		In tests	All clumps killed	No clumps killed
6/1-3.....Lassen	48	14	29.2	29	5	21
6/27-29.....Sequoia	195	137	70.3	27	6	2
June totals*	237	150	63.3	52	11	20
7/6-8.....Lassen	121	37	30.6	27	0	11
7/30-8/2.....Sequoia	150	100	66.7	27	7	5
July totals	271	137	50.5	54	7	16
8/9-11.....Lassen	137	49	35.8	33	2	12
Lassen..*	299	99	33.1	85	7	41
Sequoia.....	345	237	68.7	54	13	7
D-IPE + T-IPE	127	71	55.9	30	5	8
D-IPE	118	66	55.9	30	4	11
T-IPE	121	58	47.9	30	6	13
D-IPE + PCP	91	42	46.2	15	0	4
Subtotals	457	237	51.9	105	15	36
ACP 926	62	41	66.1	14	4	4
ACP 897	96	52	54.2	14	1	6
K-11-1	16	4	25.0	3	0	0
ACP 953	13	2	15.4	3	0	2
Subtotals	187	99	52.9	34	5	12
5.0% *	216	140	64.8	47	14	11
2.5 percent	203	92	45.3	45	2	17
1.0 percent*	647	337	52.1	47	4	20
Scarified tests	139	56	40.3	45	8	22
All tests	651	337	51.8	143	20	51

\*Data from two unsatisfactory oil-formulations deleted (ACP 638 and ACP 648).

Table 8. Defoliation tests of 1950 and 1951 on Pibes roezli.

Concentration in parts per million of the chemicals and formulations used in the treatments*				Degree of ribes bush defoliation			
				sprayed in first full leaf		sprayed when fruit mature	
D-IFE	T-IFE	ATA	NAENDO	Sierra	Plumas	Sierra	Plumas
50	--	--	--	90-100	--	80-90	--
25	25	--	--	--	80-90	--	75-95
50	--	100	--	80-90	--	80-95	--
25	25	100	--	--	80-95	--	80-95
50	--	--	100	60-90	--	70-90	--
25	25	--	100	--	80-95	--	80-95
--	--	--	100*	0-20	0-20	0-20	0-20

\*One percent flowable medium summer oil was added to all formulations containing 2,4-D, or 2,4-D and 2,4,5-T, but not to those containing NAENDO only.

### SECTION III. RIBES ECOLOGY IN CALIFORNIA, 1951

This part of the annual report summarizes current data from selected portions of the ribes ecology program in California. The approximate scope of the ecology program can be ascertained from perusal of several consecutive annual reports of the project.

#### Sugar Pine Inventory.

The pre-season training schools, held in 1950 and 1951 by BRC operations for sugar-pine inventory men, have approximately standardized inventory methods. All sugar pine trees on the one-acre ribes-regeneration plots were classified and tabulated during 1951 so that comparisons could be made with operations pine-inventory data. Inventory data on one or two plots are not identical with those taken by the more-or-less standardized method of operations men, but summaries from the one-acre plots are believed directly comparable with similar operations data.

Appended table 9 is a general summary of certain items of background data for the series of 8 one-acre ribes-regeneration plots. Table 10 summarizes results of the sugar-pine inventory on these plots. The upper half of table 10 concerns crop trees only; the lower half concerns all sugar pine trees found on the plots. In both parts of the table the line of means (next to last horizontal line) consists of per-acre figures. In the upper part of table 10 note that number of sugar pines on the one-acre plots varies from no crop trees less than 19" DBH (Rock Creek Plot, Plumas N.F.), to 24 crop trees per acre (Inter-Road Plot, Plumas N.F.), and average 10.5 sugar-pine crop trees per acre. Observe also that about 80 percent of the crop trees on these widely scattered one-acre plots are between 2" and 9" DBH. The crop-tree figures are radically different from the data for all sugar pine trees, which are summarized in the lower part of the table. Only 9.1 percent of the sugar pines found on these plots were classified as crop trees. The last line of table 10 gives the percentages, by crown classes and size classes, of crop trees to all sugar pine trees. As would be expected, this crop-tree percentage increases consistently with increase in size of tree.

From an ecologic viewpoint, table 11 further analyzes the pine-inventory data collected in 1951 from the one-acre plots. Note that the recorded crown class of about three-fourths of all sugar pines on these plots was either intermediate (19.4%) or suppressed (54.4%). The number of sugar-pine dominants which were not crop trees, fortuitously equals the exact number of potential crop trees. Of the 70 dominants which were classified as less than crop trees, 43 trees (61.4 percent) could not be classed as crop trees because of mature trees, and 27 trees (38.6 percent) were not crop trees because of tree reproduction.

## Ribes Regeneration.

In addition to the sugar pine data noted above, the one-acre ribes-regeneration plots continue to provide important ribes data on the small-bush problem, and on the problem of post-logging regeneration of ribes from pre-logging seed. Table 9 presents a general summary of certain types of background data for these plots. Tables 12 and 13 summarize ribes data collected in 1950 and 1951. The average number of known ribes plants per plot (per acre) jumped from 65.4 in 1950 to 104.7 in 1951. This increase, however, was due largely to 323 current-season seedlings found in 1951 on the Shaver Timber plot, which was logged in 1941. If this one entry is excluded, the average for 1951 becomes 58.6 ribes per acre. The total estimated ribes live stem per plot increased from an average of 181 feet (1950) to 206 feet (1951). The percentage of current-season stem to total live stem increased from 20.8 percent (1950) to 29.0 percent (1951). This infers that 1951 was a somewhat better season for ribes growth than was 1950.

The age-and-vigor data of table 13 should be considered against the background data of table 9. The apparent persistence of small hidden ribes through 2 to 4 eradications continues to be discouraging. Also note the interesting difference in ribes-age distribution between the Gentle Gully Plot (moist, brushy) and the Inter-Road Plot (dry, timbered). These two plots, both on Big Bar Mt. Ridge, were logged by the same company at about the same time, and are less than a mile apart.

## Dodge Ridge Tract.

The experimentally logged areas of the (Calif. Forest and Range Expt. Station) Dodge Ridge Tract, Stanislaus N.F., continue to be interesting from the standpoint of ribes regeneration. Early spring inspection of the 1948-logged areas in 1951 showed that a considerable number of rapidly growing bushes on the most vigorously regenerating areas would fruit in 1951 at an age of 2-plus years, that is, at the end of the third season of growth. Ribes on these areas were eradicated by a thoroughly experienced contractor in early summer, before seed had a chance to mature.

Table 14 summarizes data collected from two series of randomly distributed milacre plots on the 1948-logged areas of the Dodge Ridge Tract. See also annual reports for 1949 and 1950. The 1949-logged areas have produced very few ribes or other seedlings, but inspections of the three 25-milacre plots on these more recently logged areas are being continued.

Table 9. A general summary of background data for the one-acre ribes-regeneration plots.

One-acre plot, name	G.L.O. description		Ap-prox. alti-tude	Year, if any, when recently disturbed		Ori-ginal ribes per acre	Years of initial and subsequent eradica-tions				Numbers ribes found, first inspections, after erads.				Ribes per acre, found cita-tion			
	Sec	Twn		Eng	Logged		Burned	Year plot started	1	2	3	4	1	2		3	4	
Panianni Area	12	27N	6E	4750	None	1942	1940	137	1940	1947	--	--	5	10	--	--	25	SR 146
Rock Creek	5	23N	9E	4900	None	None	1939	228	1940	--	--	--	34	--	--	--	62	None
Gentle Gully	2	22N	5E	4000	Prior*	None	1940	308	1940	1943	1946	1949	105	140	153	21	30	None
Inter-Pond	3	22N	5E	4000	Prior*	None	1940	115	1940	1943	1946	1949	11	31	27	21	19	None
Signal Peak	7	5S	21E	6300	Prior*	None	1937	682	1937	1939	1944	--	102	91	75	--	144	SR 124
Pilot Peak	5	6S	21E	4800	Prior*	None	1937	1032	1937	1940	1948	--	42	58	58	--	65	SR 147
Blue Canyon**	14	10S	25E	5600	1915	1947	1939	937	1939	1944	--	--	31	4	--	--	**--	SR 133
Shaver Timber	13	10S	25E	6600	1941	None	1939	196	1939	1945	1949	--	12	31	117	--	388	SR 134

\*Logged prior to 1934.

\*\*This plot is no longer considered a unit of this series, because of total heavy burn in 1947 (Bretz Mill Burn).

Table 10. Sugar pine found in 1951 on one-acre ribes regeneration plots.

One-acre plot, name	Number of sugar pine trees by height and DBH classes										SP trees less than 19 in. DBH		SP trees greater than 19 in. DBH	
	C- 1.99 ft.	2- 4.5 ft.	C- 0.49 in.	0.5- 0.99 in.	1- 1.99 in.	2- 2.99 in.	3- 3.99 in.	5- 5.99 in.	9- 12.9 in.	13- 18.9 in.	19 in. DBH Total Mean	19 in. DBH trees	19 in. DBH Total Mean	19 in. DBH trees
	1	1	--	--	1	--	--	--	1	1	4	6.30	--	--
Fenianni Area	1	--	--	--	--	--	--	--	--	--	0	--	2	37.0
Rock Creek	--	--	--	--	--	4	8	2	--	--	14	4.17	--	--
Gentle Gully	--	--	--	--	--	1	11	6	3	1	24	5.57	4	26.5
Inter-Road	--	--	1	--	--	--	2	1	4	--	7	5.06	1	38.0
Cow Creek	--	--	--	--	--	--	4	5	7	--	17	4.27	1	42.0
Signal Peak	--	1	--	--	--	2	5	--	1	2	10	6.87	1	21.0
Pilot Peak	--	--	--	--	--	--	--	1	4	1	8	8.66	--	--
Shever Timber	--	--	--	--	--	--	--	--	--	2	8	--	--	--
Totals	1	1	1	1	1	13	31	23	6	6	84	--	9	--
Means	0.13	0.12	0.13	0.13	0.13	1.62	3.88	2.87	0.75	0.75	10.50	5.51	1.13	31.2
Percent	1.2	1.2	1.2	1.2	1.2	15.5	36.9	27.4	7.1	7.1	100.0	--	--	--
All sugar pine trees														
Fenianni Area	24	10	5	2	1	1	1	2	1	2	49	1.15	--	--
Rock Creek	27	12	3	2	2	1	--	1	3	--	51	0.86	4	28.9
Gentle Gully	22	18	9	10	11	10	22	6	--	--	108	1.54	--	--
Inter-Road	8	32	35	27	49	51	55	33	9	2	301	2.57	4	26.5
Cow Creek	--	4	1	3	4	3	6	7	--	--	28	2.88	2	31.0
Signal Peak	18	20	18	17	15	15	25	8	--	--	136	1.53	3	26.3
Pilot Peak	17	26	24	12	23	24	18	--	1	2	147	1.40	1	21.0
Shever Timber	14	24	4	8	12	13	9	13	2	2	101	2.12	--	--
Totals	130	146	99	81	117	118	137	69	17	7	921	--	14	--
Means	16.7	18.2	12.1	10.1	14.6	14.8	17.1	8.6	2.1	0.9	115.1	1.90	1.75	27.4
Percent	14.1	15.8	10.8	8.8	12.7	12.8	14.9	7.5	1.8	0.8	100.0	--	--	--
Crop tree %	0.8	0.7	1.0	1.2	0.8	11.0	22.6	33.3	35.3	85.7	9.1	--	64.3	--

\*Percent of those trees of a particular size class that are crop trees.



Table 11. Ecologic summary of sugar pine less than 19" DBH, found in 1951 on one-acre ribes-regeneration plots.

One-acre plot, name	Number of trees by crown and crown classes										Number of dominants, but not crop trees, by reasons †						Dominants but not crop trees because of mature trees						Dominants but not crop trees because of other cause of tree reproduction					
	D and CT	ID and CT	PCT	C	I	S	Totals	B	L	H	G	S	SP	JP & RF & trees			Totals	BO**	als	SP	WF	DF	Totals					
														JP	RF	&												
Fanni-anni	4	10	11	4	6	25	49	--	--	--	10	--	--	2	3	--	5	--	6	--	6	--	6	--				
Rock Creek	--	2	4	2	3	14	51	--	--	--	2	--	--	--	1	--	1	--	3	--	3	--	3	--				
Gentle Gully	14	7	10	11	24	52	108	--	--	--	5	2	--	--	2	--	3	5	--	2	3	5	5					
Inter-Road	24	17	15	39	75	146	301	4	1	5	5	2	--	--	3	--	6	9	2	3	1	6	6					
Cow Creek	7	8	1	3	6	4	28	6	--	--	1	1	--	1	--	--	--	--	--	--	--	--	--					
Signal Peak	17	2	6	15	32	70	136	--	--	--	--	2	2	--	--	--	2	4	--	2	--	--	2					
Pilot Peak	10	14	14	8	21	94	147	1	--	--	13	--	1	4	2	1	5	13	--	1	--	1	1					
Shaver Timber	8	10	9	5	12	66	101	2*	2	--	5	--	--	--	5	--	--	--	4	--	4	--	4					
Totals	84	70	70	87	179	501	921	14	3	5	41	7	3	7	16	1	16	43	2	21	4	27	27					
Mean Nos.	10.5	8.8	8.7	10.9	22.4	62.6	115.1	1.8	0.4	0.6	5.1	0.9	0.4	0.9	2.0	0.1	2.0	5.4	0.3	2.6	0.5	3.4	3.4					
Per-cent	9.1	7.6	7.6	9.4	19.4	54.4	99.9	20.0	4.3	7.1	58.6	10.0	7.0	16.3	37.2	2.3	37.2	14.8	--	7.4	77.8	14.8	--					
Mean DBH	5.5	2.7	2.9	3.9	2.6	0.6	1.9	--	--	--	--	--	--	--	--	--	--	3.5	--	--	--	--	2.0					

\*Includes 1 dominant tree discarded from crop trees because of Q (quality).

\*\*Black oak, and other dicots.

\*\*\*Defective, or otherwise unacceptable as crop trees.

† If necessary, see Pine Appraisal Manual for abbreviations used.

Table 12. Number and size of ribes plants found in 1950 and 1951 on one-acre ribes-regeneration plots.

One-acre plot name	Date of inspection	Number of known ribes plants by size (TSL) classes as shown							Total known ribes	Estimated total length ribes live stem, feet*			ribes mean size, feet of TSL	CSS, per-cent. of TSL	
		Year	by size (TSL) classes as shown							Total known ribes	CSS	OLS			TSL
			C-1st	5-11.9	12-35	36-71	71-11.9	24.9 ft. plus							
Inspections of 1950															
Funianni Area	9/2/50	1947	3	6	10	1	2	--	22	16.1	25.6	41.7	1.89	38.6	
Rock Creek	8/31/50	1940	17	15	16	9	6	1	2	66	61.9	173.2	235.1	3.56	
Gentle Gully	8/30/50	1950	6	7	3	3	2	--	21	6.1	31.2	37.3	1.78	16.3	
Inter-Road	8/29/50	1949	2	5	4	3	3	1	21	21.1	112.6	133.7	6.37	15.8	
Signal Peak	8/8/50	1944	4	22	50	36	25	9	3	149	131.8	564.1	695.9	4.67	
Pilot Peak	8/17/50	1948	9	15	28	6	4	--	62	21.4	95.4	116.8	1.88	18.3	
Shaver Timber	8/16/50	1949	114	3	--	--	--	--	117	5.5	0.3	5.8	0.05	95.0	
Totals			155	73	111	58	42	13	6	458	263.9	1002.4	1266.3	20.20	
Means			22.1	10.4	15.9	8.3	6.0	1.9	0.9	65.4	37.7	143.2	180.9	2.886	
Percent			33.8	15.9	24.2	12.7	9.2	2.8	1.3	99.9	20.8	79.2	100.0	---	
Inspections of 1951															
Funianni Area	8/17/51	1947	1	8	9	4	2	1	--	25	34.5	37.2	71.7	2.87	
Rock Creek	8/11/51	1940	6	20	16	9	6	3	2	62	84.9	200.2	285.1	4.60	
Gentle Gully	8/9/51	1950	12	8	5	3	2	--	1	30	9.4	34.4	43.8	1.46	
Inter-Road	8/10/51	1949	--	5	3	3	5	2	1	19	29.7	115.0	144.7	7.62	
Signal Peak	7/25/51	1944	5	21	48	32	25	8	5	144	199.1	542.2	741.3	20.5	
Pilot Peak	7/26/51	1948	13	16	24	8	3	1	--	65	33.5	89.8	123.3	5.15	
Shaver Timber	7/28/51	1949	370	14	3	1	--	--	--	388	27.5	4.3	31.8	27.2	
Totals			407	92	108	60	43	15	8	733	413.6	1023.1	1441.7	86.5	
Means			58.1	13.1	15.4	8.6	6.1	2.1	1.1	104.7	59.8	146.2	206.0	24.07	
Percent			55.5	12.6	14.7	8.2	5.9	2.0	1.1	100.0	29.0	71.0	100.0	37.21	

\*CSS = current-season stem, OLS = older live stem, and TLS = total live stem.

Table 13. Age and vegetative vigor of bushes found in 1950 and 1951 on one-acre ribes-regeneration plots.

One-acre plot name*	Date of inspec- tion	Visually estimated**				Number of ribes bushes, by estimated years of age										Total known ribes			
		vigor of ribes				CSS (O)	years												
		E	G	F	P		VP	1	2	3	4	5	6	7	8		9	10	11-16 plus
Inspections of 1950																			
Fanianni Area	9/2/50	--	2	15	3	2	--	2	1	--	4	13	2	--	--	--	--	22	
Rock Creek	8/31/50	2	7	20	21	16	--	4	1	3	5	6	3	6	4	10	4	12	8
Gentle Gully	8/30/50	--	--	5	8	8	--	2	2	2	3	1	3	3	2	--	3	--	21
Inter-Road	8/29/50	--	5	6	2	8	--	--	--	--	--	--	--	2	5	8	--	6	21
Pilot Peak	8/17/50	--	4	12	19	27	--	--	--	1	--	1	--	1	6	4	4	32	13
Shaver Timber	8/16/50	2	12	19	25	59	110	7	--	--	--	--	--	--	--	--	--	--	62
Totals		4	30	77	78	120	110	15	4	6	12	21	8	12	17	22	11	50	21
Means		0.7	5.0	12.8	13.0	20.0	18.3	2.5	0.7	1.0	2.0	3.5	1.3	2.0	2.8	3.7	1.8	8.3	3.5
Percent		1.3	9.7	24.9	25.2	38.8	35.6	4.9	1.3	1.9	3.9	6.8	2.6	3.9	5.5	7.1	3.6	16.2	6.8
Inspections of 1951																			
Fanianni Area	8/17/51	--	6	12	4	3	--	1	2	1	--	5	13	2	--	--	1	--	25
Rock Creek	8/11/51	1	8	19	15	19	--	--	4	--	4	3	5	3	5	3	10	14	11
Gentle Gully	8/9/51	--	--	6	14	10	5	1	2	2	2	3	2	3	3	2	1	4	--
Inter-Road	8/10/51	--	3	5	5	6	--	--	--	--	--	--	--	--	2	4	7	5	1
Pilot Peak	7/26/51	--	--	12	16	37	--	1	--	--	2	--	1	--	1	6	4	31	19
Shaver Timber	7/28/51	--	--	--	--	--	323	55	9	1	--	--	--	--	--	--	--	--	388
Totals		1	17	54	54	75	328	58	17	4	8	11	21	8	11	15	22	55	31
Means		0.2	3.4	10.8	10.8	15.0	53.8	9.7	2.8	0.7	1.3	1.8	3.5	1.3	1.8	2.5	3.7	9.2	5.2
Percent		0.5	8.5	26.9	26.9	37.3	55.7	9.8	2.9	0.7	1.4	1.9	3.6	1.4	1.9	2.5	3.7	9.3	5.3

\*The data presented in this table were not recorded in 1950 and 1951 for the Signal Peak plot.

\*\*E = excellent, G = good, F = fair, P = poor, and VP = very poor. Estimated vigor data were not recorded in 1951 for the Shaver Timber plot.

Table 14. Ribes, brush, and tree seedlings found (1949-1951) on Dodge Ridge milacres, 1948-logged areas.

Genus and species	SE 1/4 of NW 1/4, sec. 26. (50 milacres)							SE 1/4 of NE 1/4, sec. 27. (52 milacres)						
	1949		1950		1951			1949		1950		1951		
	CSS	CSS	One yr.	To- tal	CSS	1-2 yrs	To- tal	CSS	CSS	One yr.	To- tal	CSS	1-2 yrs	To- tal
Ribes roezli	141	78	89	167	51	61	112	52	24	8	32	22	19	41
R. nevadense	*18	9	15	24	6	2	8	*8	2	7	9	0	2	2
Ribes cereum	*12	3	8	11	9	5	14	*0	0	0	0	0	0	0
R. viscosis.	*6	0	0	0	*3	1	4	*0	0	0	0	0	3	3
All species Ribes	177	101	112	213	69	69	138	60	26	15	41	22	24	46
All species Ceanothus	**	30	31	61	8	43	51	**	35	14	49	28	35	63
All species Manzanita	--	2	0	2	0	0	0	--	20	14	34	59	21	80
Sugar pine	--	0	10	10	0	10	10	--	1	21	22	0	19	19
FP and JP	--	0	3	3	0	3	3	--	0	1	1	1	1	2
WF and RF	--	0	183	183	0	142	142	--	1	247	248	0	168	168
Incense cedar	--	4	0	4	0	2	2	--	7	1	8	0	5	5
Total conifers	--	4	196	200	0	157	157	--	9	270	279	1	193	194

\* = Estimated from total of Ribes other than R. roezli.

\*\* = Not recorded in 1949.

FISCAL YEAR ALLOTMENTS FROM WHICH EXPENDITURES  
WERE MADE BY THE DEVELOPMENT AND IMPROVEMENT PROJECT  
DURING THE CALENDAR YEAR 1951

Federal Funds

Fiscal Year 1951

\$40,000

Fiscal Year 1952

\$40,000

Expenditures by the Development and  
Improvement Project for the Calendar Year 1951

Fiscal Year 1951  
1/1 to 6/30/51

\$20,653

Fiscal Year 1952  
7/1 to 12/31/51

\$22,115

Total

\$42,768 \*

\*Expenditure distribution by states

California	\$17,107
Idaho	12,831
Montana	2,138
Oregon	4,277
Washington	<u>6,415</u>

Total           \$42,768







WHITE PINE BLISTER RUST CONTROL

NORTHWESTERN PROJECT

January 1 to December 31, 1951

United States Department of Agriculture  
Agricultural Research Administration  
Bureau of Entomology and Plant Quarantine  
Western Region IV  
Blister Rust Control  
618 Realty Building  
Spokane, Washington







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# WHITE PINE BLISTER RUST CONTROL - NORTHWESTERN PROJECT, 1951

Herman E. Swanson, Project Leader

The progress of blister rust control in the Northwest in 1951 did not measure up to that of several previous seasons. This was due to several factors. Labor was in short supply making it necessary for the Forest Service to set 17 years as a minimum age while the Bureau hired a few under 18 years to fill its quota. The higher wages paid in lumbering and construction and the loss of men to the armed forces caused considerable labor turnover with the result that the 1951 blister rust crews were not of the high caliber of the previous season. Also many of the ribes eradication contractors did not return so this effective procedure took a slight setback in 1951. The bad fire season and the frequent calls for blister rust crews for fire duty disrupted the orderly and efficient progress of ribes eradication work and caused the loss of a large number of good working days to the project.

On the favorable side are the significant advancements made in chemical eradication of ribes and the good results appearing from this type of work performed in the last 2 years. This subject and other developments will be presented in succeeding paragraphs.

## Progress in 1951

The agencies directly engaged in ribes eradication were as follows:

<u>Agencies</u>	<u>No. of Camps</u>	<u>No. of Workers</u>
Bureau of Entomology and Plant Quarantine (State of Idaho, Clearwater, Potlatch, and Priest Lake Timber Protective Associations as cooperators)	5	230
U. S. Forest Service	30	1,060
National Park Service	<u>4</u>	<u>73</u>
Total	39	1,363

Total accomplishments under each work program were as follows:

<u>Agency</u>	<u>Initial Acres</u>	<u>Rework Acres</u>	<u>Total Acres</u>	<u>Total Man- Days</u>	<u>Destroyed Ribes</u>	<u>Per Acre Man- Days</u>	<u>Per Acre Ribes</u>
Bureau of Entomology and Plant Quarantine	2,880	3,360	6,240	7,330	830,000	1.17	133
Forest Service	2,050	32,970	35,020	35,560	1,435,000	1.02	41
National Park Service	<u>2,900</u>	<u>2,170</u>	<u>5,070</u>	<u>3,880</u>	<u>175,000</u>	<u>.77</u>	<u>35</u>
Total	7,830	38,500	46,330	46,770	2,440,000	1.01	53

## Immediate Objectives

References have been made in previous reports to the analyses made of the white pine units in the various forest areas and the selection of the top priority units on which control work will be concentrated over the 5-year period 1950-54. These units number 107 and contain 618,000 acres. The future white pine yield on these units is conservatively estimated at 7.6 billion board feet from age classes 70 years and under. Work is progressing very well on these units. Much of the work now involves the cleanup of scattered ribes locations to complete protection within many of the units. High priority units outside the present program will be added when the necessary work is completed in the present program units.

The coordination of timber management practices with ribes eradication within these units is simplifying the blister rust control problem and assuring a high regeneration of white pine.

## Ribes Eradication by Chemical Methods

The mounting of a blower and a power sprayer on 6x6 trucks made it possible to use power equipment for spraying ribes in situations previously inaccessible to lighter equipment. The Bureau and Forest Service programs also had more use for the portable power sprayers transported into remote areas by mules and then moved as necessary by hand. Improved hose layouts and nozzles have also increased the speed and efficiency of spraying operations. Results show that chemical methods where applied are doing the job for a fraction of what would be involved by other methods. Checks show that a single treatment has been effective in destroying the ribes in some cases and in all instances a respray has been very effective. This indicates that a rapid inexpensive initial broadcast coverage followed by respray the next season may be the most economical procedure for complete ribes destruction. Present results show that at least one less working will be required as compared to hand methods.

In 1951, 2,372 acres were treated using 4,057 man-days and 225,707 gallons. This acreage is more important than its size would indicate since it includes numerous areas ranging in size from half an acre to blocks 200 acres in size scattered over the area of 47,000 acres worked in 1951. As the activities shift from the rework on present program units to initial work on new units, most of the work will be done by chemical methods.

## Spread of Blister Rust

Scouting in 1951 found blister rust infection east and south of previously known limits. An infected white bark pine (Pinus albicaulis) was found on Carnelian Creek in the Mount Washburn control unit of Yellowstone National Park. Infected pine (P. albicaulis) were found for the first time in Powell County, Montana, probably a 1941 infection and in Adams County, Idaho, probably a 1945 infection. Blister rust on ribes was found for the first time in Fergus and Wheatland Counties, Montana, and in Big Horn County, Wyoming.



## Blister Rust Damage in Mature Stands

In the upper St. Joe River drainage considerable blister rust damage in mature white pine stands is beginning to appear. A survey was conducted to determine the present extent of damage and to forecast the annual rate of future damage. The survey showed that 64 percent of the 268 trees examined along survey strips extending from creek to ridge had blister rust cankers in the trunks or had branch cankers capable of reaching the trunk. The average height where these killing cankers entered or will enter the trees is 67 feet above the ground and the average of the tree diameters at these points of entrance is 10 inches. In some cases cankers have already caused top-flagging in trees in the drainage, while in the case of one of the sampled trees it is estimated that 38 years more will be required for the canker to enter the trunk and girdle it. Of the fatally infected trees, the average length of additional time required for top-flagging is 20 years. From Forest Service studies of broken-topped trees, it is estimated that the rust infected trees would have a life expectancy of 10 years after top-flagging occurs. This means that these infected trees will be dying over the next 50 years with the average life expectancy of about 30 years.

## Rust Resistant White Pine

During the last 2 years, 2,900 grafts were made from 31 of the best rust resistant trees. Some selections grafted readily with as high as 80 percent survival. The average survival was 60 percent. In 1951, these grafts were outplanted in five plots of 6 to 7 acres each located in the midst of heavy blister rust infection at various points throughout the Inland Empire. Each plot contains 216 spots for graft plantings. One grafted tree, one white pine seedling as a control and two plants each of Ribes lacustre and R. viscosissimum were planted on 186 of these spots in each plot. Six lots of 12 grafts and controls were sent to cooperators in northern and southern Oregon, British Columbia, Wisconsin, Ontario, and New York for planting and further testing for resistance.

In 1951, seed was collected from 85 of the 93 crosses of controlled pollinations made among the resistant trees in 1950. An adequate quantity of seed for first ( $F_1$ ) generation testing was secured from 78 of the crosses. The seed will be planted and the seedlings held in the nursery beds for 2 years after which they will be planted on the same plots as the grafted stock. Also in 1951, 33 new crosses were made by controlled pollination, including several interspecies crosses. Lack of pollen probably due to late frosts, prevented the making of further crosses.

During the year seven additional apparently rust resistant trees were found on three old infection centers, bringing the total to 56 cankerless trees and 10 trees with one or two cankers.

## Treatment of Infected Trees

The need for a chemical which can be economically applied as a spray to eliminate blister rust from infected trees is very great. It would have a large use in protected areas where a considerable portion of the white pine became infected before control work was completed, also in areas of excellent

white pine where the amount of healthy trees does not warrant the cost of control, and in the pole sized and mature timber where infection now present will cause the untimely death of trees.

For the development of a possible method for eliminating blister rust from infected trees, experimental chemical spray treatments were started in 1949 and initial results were sufficiently encouraging to expand the work in 1951 when a series of 114 treatments was applied to portions of 570 trees. Actidione, a by-product in the manufacture of streptomycin, is the most promising chemical tested. Best results to date were obtained when it was used in combination with the ester of 2,4,5-T. In 1951, actidione and other chemicals were used in various combinations and concentrations.

#### SUMMARY OF PROGRESS

A summary of blister rust control activities in the Northwestern Project is presented in the following tables:

TABLE 1

## SUMMARY OF RIBES ERADICATION BY STATES AND OPERATING AGENCIES - 1951

State	Operating Agency	First Working			Second Working			Other Workings			All Workings			Per Acre	Number of Man-Days	Total Seasonal Employees
		Acres	Man-Days	Ribes	Acres	Man-Days	Ribes	Acres	Man-Days	Ribes	Acres	Man-Days	Ribes			
Idaho	BEPQ	2,880	702,000	2,840	1,760	89,000	2,580	1,600	39,000	1,910	6,240	870,000	7,370	133	1,117	270
	FS	980	145,000	1,280	11,420	253,000	10,090	178,000	15,100	17,010	27,070	576,000	24,470	21	1,08	812
	Subtotal	3,860	847,000	4,120	13,180	342,000	12,670	16,270	217,000	17,010	33,310	1,406,000	33,800	42	1,03	24
Montana	FS	1,070	623,000	2,190	1,350	72,000	2,120	1,490	48,000	1,760	3,910	743,000	6,070	190	1,55	1,048
	NPS							1,460	25,000	610		25,000	610	54	1,33	167
	Subtotal	1,070	623,000	2,190	1,350	72,000	2,120	2,650	73,000	2,370	4,370	768,000	6,680	176	1,33	180
Washington	FS				390	46,000	210	3,650	70,000	2,810	4,040	116,000	3,020	29	75	3
	NPS							710	12,000	530		12,000	530	17	75	7
	Subtotal				390	46,000	210	4,360	82,000	3,340	4,750	128,000	3,550	27	75	10
Colorado	NPS	2,900	89,000	1,780	1,30	1,000	90		8,000	50	3,030	90,000	1,870	30	162	36
	FS				810	40,000	820	60			870	48,000	870	55	1,00	1
	Subtotal	2,900	89,000	1,780	1,30	1,000	90		8,000	50	3,900	138,000	2,740	85	162	37
Wyoming	BEPQ	2,880	702,000	2,840	1,760	89,000	2,580	1,600	39,000	1,910	6,240	870,000	7,370	133	1,117	270
	FS	2,050	768,000	3,470	13,160	371,000	12,420	19,810	236,000	19,670	35,020	1,445,000	35,560	41	1,02	30
	Subtotal	2,900	89,000	1,780	940	41,000	910	1,230	45,000	1,190	5,070	175,000	3,880	35	77	73
All States	FS	7,830	1,559,000	8,090	15,860	501,000	15,910	22,640	380,000	22,770	46,330	2,440,000	46,770	53	1,01	39
	Total															1,363

TABLE 2

## ACREAGE WORKED BY LAND OWNERSHIP - 1951

Land Ownership	First Working		Second Working		Other Workings		All Workings	
	Acres	Man-Days	Acres	Man-Days	Acres	Man-Days	Acres	Man-Days
National Forest Region 1	2,700	12,490	17,360	32,590				
National Park	2,670	810	4,710					
State and Private	2,460	1,230	4,050	9,070				
Total	7,830	15,860	22,640	46,330				

TABLE 3

## SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1951

State	Federal Funds				Cooperative Funds			
	Entomology and Plant Quarantine	Forest Service	Park Service	Total Federal Funds	Direct Aid	Indirect Aid	Total (Direct and Indirect Aid)	Total All Fundings
Idaho	\$ 90,010	\$95,900	\$734,085	\$ 919,995	\$38,304	\$2,000	\$40,304	\$ 960,302
Mont.	18,080	152,462	9,406	179,948	1,000	1,000	2,000	180,948
Neab.	16,461	89,112	9,694	115,267	1,000	1,000	2,000	116,267
Calif.	4,864		28,911	33,775				33,775
Wyo.		14,680	19,544	34,224				34,224
Total	\$134,273	\$95,900	\$975,662	\$2,305,532	\$42,304	\$4,000	\$46,304	\$2,351,836





TABLE A

STATUS OF RIBES ERADICATION BY STATES - ALL OWNERSHIPS, DECEMBER 31, 1951  
Accumulative Series - Net

State	Total Acres		First Working		Second Working		Other Workings		On Maintenance		Remaining Work	
	White Pine	Control Area Wh.P. & Prot. Zone	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Unworked Requiring Rework Acres	Acres
Idaho	1,875,000	2,188,000	1,148,000	65	1,74,000		174,000		502,000	23	760,000	926,000
Montana	205,140	213,140	152,140	71	24,620		11,510		85,360	40	61,000	66,760
Washington	124,500	135,500	101,500	75	38,300		28,220		30,330	22	34,000	71,170
Colorado	6,100	6,100	6,100	100	130				3,720	61		2,380
Wyoming	13,100	13,100	9,590	73	3,110		210		7,130	54	3,510	2,460
Total	2,223,840	2,555,840	1,697,330	66	540,190		213,940		628,560	25	858,510	1,068,770

TABLE B

SUMMARY OF STATUS OF RIBES ERADICATION BY LAND OWNERSHIP, DECEMBER 31, 1951  
Accumulative Series - Net

Land Ownership	Total Acres		First Working		Second Working		Other Workings		On Maintenance		Remaining Work	
	White Pine	Control Area Wh.P. & Prot. Zone	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Unworked Requiring Rework Acres	Acres
National Forests R-1	1,183,000	1,387,000	1,065,000	77	337,000		123,000		379,000	27	322,000	686,000
National Parks	28,110	28,110	24,600	88	11,860		14,940		17,070	61	3,510	7,530
Public Domain	21,000	29,000	15,000	52	6,000		3,000		7,000	24	14,000	8,000
State and Private Lands	991,730	1,111,730	592,730	53	186,130		73,000		225,190	20	519,000	467,240
Total	2,223,840	2,555,840	1,697,330	66	540,190		213,940		628,560	25	858,510	1,068,770



# COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS

Herman E. Swanson, Project Leader

Calendar Year 1951

In 1934 a control area of the best white pine type in the Inland Empire was established on which to plan and conduct blister rust control. This control area included 1,318,000 acres of state and private lands. Since that time land exchanges and donations to the Federal government and minor revisions have reduced this total to 1,111,000 acres. This original selection of white pine land is now of historical significance only. Logging and the lack of white pine regeneration, inroads of blister rust on existing stands, and the exigencies occasioned by the small blister rust control program necessitate a new perspective of the situation.

An analysis has been made of the white pine growing units of predominately state and privately owned lands and the field summaries are being revised to reflect the control status for the white pine units on which control work is being concentrated. For the State of Idaho, in which the Bureau cooperative program is confined, the analysis shows that of 88 units (946,000 acres) predominately state and private lands, 54 units (487,500 acres) can still be held in the control area while 34 units (458,500 acres) have been dropped indefinitely due to low pine values, excessive blister rust damage, or lack of white pine regeneration following logging. Of the 54 units retained, present financing of cooperative work by federal, state and private funds is handling 23 units (153,000 acres) with a strong likelihood of expanding to 30 units (186,600 acres) inside of 20 years.

The following tabulation shows a breakdown of the 54 units (487,500 acres) with the estimates for blister rust control costs to complete protection and the estimated yield from present young stands or from the next crop following the cutting of the mature stands:

Area	Acres by Ownership				Yield	Future Costs	
	Fed.	State	Priv.	Total	Million Bd.Ft.	Total Amount	Per MBF
Top Priority Units (Present Program)							
Clearwater	3,000	10,600	39,800	53,400	1,299	\$ 947,000	\$ .73
St. Joe	20,900	14,500	39,900	75,300	1,321	1,723,000	1.30
Kaniksu	11,500	32,600	13,800	57,900	683	529,000	.77
Subtotal	35,400	57,700	93,500	186,600	3,303	3,199,000	.97
High Value Units (Immature Stands) Not in Present Program							
Clearwater	1,500	4,900	19,800	26,200	594	878,000	1.48
St. Joe	9,300	3,800	16,700	29,800	342	578,000	1.69
Subtotal	10,800	8,700	36,500	56,000	936	1,456,000	1.56
Potentially High Value Units of Recent Cutover							
Clearwater	100	2,400	5,000	7,500	217	246,000	1.13
St. Joe	5,100	2,500	34,000	41,600	849	1,750,000	2.06
Subtotal	5,200	4,900	39,000	49,100	1,066	1,996,000	1.87
High Value Units of Mature Stands to be Cut in Next 20 Years							
Clearwater	3,800	29,200	54,000	87,000	3,071	2,734,000	.89
St. Joe	11,400	36,400	61,000	108,800	3,751	4,460,000	1.19
Subtotal	15,200	65,600	115,000	195,800	6,822	7,194,000	1.05
Grand							
Total	66,600	136,900	284,000	487,500	12,127	\$13,845,000	\$1.14

The amount of funds from state and private agencies was increased 20 percent for the fiscal year 1952 by virtue of an increase in Idaho's annual appropriation from \$25,000 to \$30,000 and an additional \$3,210 from Potlatch Forests, Inc.

Reports on the cooperative work on the Clearwater, Potlatch, and Priest Lake Timber Protective Associations are included with Clearwater, St. Joe, and Kaniksu operation reports. A summary of the cooperative program in the State of Idaho and of work on state and private lands in the Northwest is presented in the following tabulations:

1. Allotments:

<u>Agency</u>	<u>Fiscal Year 1951</u>	<u>Fiscal Year 1952*</u>
Federal (EPQ)	\$100,000.00	\$103,000.00
State of Idaho	25,000.00	30,000.00
Clearwater T.P.A.	6,661.52	6,662.00
Potlatch T.P.A.	5,460.66	5,461.00
Priest Lake T.P.A.	4,192.10	4,192.00
Potlatch Forests, Inc.		3,210.00
Total	\$141,314.28	\$152,525.00

\*Approximate

2. Field Program and Expenditures - Calendar Year 1951

<u>Operation</u>	<u>Number Camps</u>	<u>Number Workers</u>	<u>Number Contracts</u>	<u>S&amp;P Funds</u>	<u>Federal Funds</u>	<u>Total Funds</u>
Clearwater	2	89	1	\$16,725	\$37,206	\$ 53,931
St. Joe	2	100		16,272	35,352	51,624
Kaniksu	<u>1</u>	<u>41</u>	<u>2</u>	<u>5,307</u>	<u>23,342</u>	<u>28,649</u>
Total	5	230	3	\$38,304	\$95,900	\$134,204

3. Cooperative Ribes Eradication in Idaho, 1951

<u>Operation</u>	<u>Initial Work Acres</u>	<u>Rework Acres</u>	<u>Total Worked Acres</u>	<u>Man- Days</u>	<u>Ribes</u>	<u>Per Acre Man- Days</u>	<u>Ribes</u>
Clearwater		1,960	1,960	2,770	59,000	1.41	30
St. Joe	1,160	1,230	2,390	2,860	619,000	1.20	259
Kaniksu	<u>1,720</u>	<u>170</u>	<u>1,890</u>	<u>1,700</u>	<u>152,000</u>	<u>.90</u>	<u>80</u>
Total	2,880	3,360	6,240	7,330	830,000	1.17	133

4. State and Private Lands Worked in 1951

<u>State</u>	<u>First Working Acres</u>	<u>Second Working Acres</u>	<u>Other Workings Acres</u>	<u>Total Worked Acres</u>
Idaho	2,230	2,390	4,050	8,670
Washington		40		40
Colorado	<u>230</u>	<u>130</u>	<u>      </u>	<u>360</u>
Total	2,460	2,560	4,050	9,070

5. Net Progress on State and Private Lands, 1923-1951

<u>State</u>	<u>First Working Acres</u>	<u>Second Working Acres</u>	<u>Other Workings Acres</u>	<u>Maintenance Acres</u>	<u>Unworked Acres</u>	<u>Control Area Total Acres</u>
Idaho	566,000	181,000	70,000	208,000	501,000	1,067,000
Montana	19,000	3,000	2,000	14,000	14,000	33,000
Washington	7,000	2,000	1,000	3,000	4,000	11,000
Colorado	<u>730</u>	<u>130</u>	<u>      </u>	<u>490</u>	<u>      </u>	<u>730</u>
Total	592,730	186,130	73,000	225,490	519,000	1,111,730

6. Summary of Expenditures from State and Private Funds (Idaho) 1928-1951

<u>Year</u>	<u>State</u>	<u>Private and T.P.A.</u>	<u>Total</u>
1928	\$ 2,518.55	\$ 2,264.32	\$ 4,782.87
1929		19,027.66	19,027.66
1930		20,000.00	20,000.00
1931	5,000.00	35,905.32	40,905.32
1932	8,003.43	11,186.33	19,189.76
1933			
1934	29,154.06		29,154.06
1935	15,000.00		15,000.00
1936	16,998.25		16,998.25
1937	15,001.25		15,001.25
1938	15,000.44		15,000.44
1939	15,438.04		15,438.04
1940	10,034.48		10,034.48
1941	7,542.73	15,756.40	23,299.13
1942	22,761.68	15,440.78	38,202.46
1943	12,252.13	386.68	12,638.81
1944	12,506.60	15,612.98	28,119.58
1945	6,287.68	5,111.03	11,398.71
1946	14,943.35	26,651.65	41,595.00
1947	15,028.11	15,909.24	30,937.35
1948	20,025.00	15,953.94	35,978.94
1949	20,003.03	16,016.58	36,019.61
1950	24,141.65	16,246.66	40,388.31
1951	21,990.11	16,314.28	38,304.39
Total	\$309,630.57	\$247,783.85	\$557,414.42





HIGHLIGHTS OF NATIONAL FOREST OPERATIONS  
Calendar Year 1951  
G. M. DeJarnette, Forester  
Blister Rust Control, U.S.F.S., Region One

Details of the national forest operations will be found in the separate reports prepared jointly by the Bureau and Forest Service operations men.

In viewing the operations region-wide, there are several points worthy of comment.

#### Chemical Eradication

The use of chemicals increased very markedly. Both broadcast spraying with power equipment and selective spraying with hand equipment are becoming more popular with field men as they see the results of past spraying and become better acquainted with techniques.

A major purchase of unsatisfactory chemical was rejected and returned at the supplier's expense. A better grade of chemical was subsequently obtained at slightly less cost per pound of parent acid than the original. There was, therefore, no damage claim for excess cost against the original supplier. We gained valuable experience in setting up specifications and chemical procurement.

Helicopter spraying was continued. One thousand and nineteen acres were sprayed at a cost of \$8.68 per acre. This is a reduction of \$3.43 per acre over 1950 spraying. This job was interrupted by fire use of the helicopter and a prior contract with Twentieth Century Fox for use in the picture "Red Skies Over Montana." Results of the 1950 helicopter work are spotted but on the whole are good. It is evident that one time over will not suffice. The cost ratio between helicopter spraying and hand work is sufficient to permit two or three sprayings and still leave a balance in favor of the "copter" on those areas where the helicopter can be used. Respray of 1950 areas will be checked next year. It seems safe to say at this time that the helicopter will be a good tool to be used in its place along with other tools and methods to accomplish cheaper ribes eradication.

#### Labor

Labor was generally weaker in supply and quality. Younger boys were in the majority. Considerable loss of men was caused by the \$500 rule imposed by tax paying dads. Ways and means to overcome this loss of manpower in the most productive part of the season received much thought and discussion. Letters to dads at employment time will be tried. Those who quit for this reason will not be rehired unless they promise to stay through the season.

#### Contracting

Contracting ran at about the same level as 1950. Experienced contractors are becoming scarcer. They are being taken by the armed services or are finding employment in industry at higher net pay. All things considered - labor supply, accessibility of areas to be worked, and competitive industry contracts - it seems doubtful that contracted acreage will increase in the next year or two at least.

## Fire Drain

Financial analyses have not been completed by the forests. The loss of effective man-days to fire is known to have been greater than for a number of years. On some forests, the last 2 weeks of the most effective part of the BRC season were almost entirely devoted to fighting fire.

## Unit Analyses and Unit Management

Good progress has been made in this phase of the work. Unit analysis work fitted perfectly into the design of a blister rust program for the Columbia Basin Comprehensive Agricultural Plan which is now being developed. Further progress has been made in the integration of blister rust plans with cutting, management plans, and other phases of resource management.

Disease surveys in young mature white pine on the upper St. Joe have disclosed a heavier infection than was thought to exist. Management plans have been revised to meet this threatened loss. The details of this survey are reported on by R. T. Bingham. Extension of this type of survey in other similarly vulnerable stands is planned for next season.

Analysis of the last units which may have a place in any economically sound program is now in the final stage. Work on this phase of the operation will from here on be maintenance. Data will be strengthened and some shifting of units will be required to meet changing conditions. The bulk of the work is done.

The expenditures and progress in blister rust control by the U. S. Forest Service are summarized in the following tables:

### 1. Expenditures

<u>Forest</u>	<u>Regular Funds</u>		<u>Emergency Funds</u>	<u>Total</u>
	<u>1951</u>	<u>1930-1951</u>	<u>1933-1942</u>	
Clearwater	\$142,673	\$ 1,845,146	\$ 413,455	\$ 2,258,601
St. Joe	282,091	3,362,510	383,340	3,745,850
Coeur d'Alene	160,179	1,980,421	669,810	2,650,231
Kaniksu	238,257	2,038,735	458,055	2,496,790
Cabinet	82,619	813,209	258,477	1,071,686
Kootenai	69,843	624,936	28,233	653,169
Total	\$975,662	\$10,664,957	\$2,211,370	\$12,876,327

## 2. Ribes Eradication by Forest Crews in 1951

<u>Forest</u>	<u>Initial</u>	<u>Rework</u>	<u>Total</u>	<u>Man-</u> <u>Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>Work</u> <u>Acres</u>	<u>Acres</u>	<u>Worked</u> <u>Acres</u>			<u>Man-</u> <u>Days</u>	<u>Ribes</u>
Clearwater	550	5,300	5,850	4,110	86,000	.70	15
St. Joe	150	9,990	10,140	11,860	221,000	1.17	22
Coeur d'Alene	280	4,550	4,830	5,440	106,000	1.13	22
Kaniksu		10,290	10,290	8,080	279,000	.79	27
Cabinet	410	1,090	1,500	3,600	563,000	2.40	375
Kootenai	660	1,750	2,410	2,470	180,000	1.02	75
Total	2,050	32,970	35,020	35,560	1,435,000	1.02	41

## 3. Net Progress on National Forest Lands, 1923-1951

<u>Forest</u>	<u>First</u>	<u>Second</u>	<u>Other</u>	<u>Maintenance</u> <u>Acres</u>	<u>Unworked</u> <u>Acres</u>	<u>Control Area</u>
	<u>Working</u> <u>Acres</u>	<u>Working</u> <u>Acres</u>	<u>Workings</u> <u>Acres</u>			<u>Total</u> <u>Acres</u>
Clearwater	154,000	61,000	27,000	45,000	46,000	200,000
St. Joe	201,000	102,000	41,000	67,000	94,000	295,000
Coeur d'Alene	310,000	63,000	24,000	99,000	51,000	361,000
Kaniksu	272,000	93,000	25,000	100,000	84,000	356,000
Cabinet	68,000	11,000	5,000	31,000	8,000	76,000
Kootenai	60,000	7,000	1,000	37,000	39,000	99,000
Total	1,065,000	337,000	123,000	379,000	322,000	1,387,000



# BLISTER RUST CONTROL ON NATIONAL PARKS

Herman E. Swanson, Project Leader

Calendar Year 1951

Reports on blister rust control work for Mount Rainier, Glacier, Yellowstone, and Rocky Mountain National Parks have been prepared. The highlights of these reports are summarized in this consolidated report.

The use of chemical methods of ribes eradication is achieving excellent results in all the parks. In Mt. Rainier and Glacier, chemical treatments are being used to advantage on clean-up work in spots which previously had been troublesome for hand work. The largest dividends from chemical work are being secured in Yellowstone and Rocky Mountain for the reason that 2,4,5-T was discovered in time to be used on much of the initial ribes eradication work.

The National Park Service has approved an addition of 3,500 acres to the Mount Washburn control unit in Yellowstone. This acreage is largely in the West Fork of Carnelian Creek. From a protection standpoint it improves the entire Mount Washburn unit by extending control boundaries to take advantage of topographic barriers and to eliminate ribes concentrations which would have been a serious threat to the previous unit. As now constituted, the control unit contains the entire head of Carnelian Creek drainage as well as important areas on the other slopes of Mount Washburn and Dunraven. The unit is well populated with fine stands of Pinus albicaulis all of which is visible from the highway. The discovery of a blister rust canker on a P. albicaulis on Carnelian Creek on the outer boundary of the protection zone of the former unit makes the extension to the unit very timely.

Expenditures and progress of control work are presented in the following summaries:

## 1. Expenditures by the National Park Service

<u>National Park</u>	<u>Calendar Year 1951</u>	<u>All Years</u>
Mount Rainier	\$ 9,694	\$155,450
Glacier	9,406	148,639
Yellowstone	14,680	175,727
Rocky Mountain	<u>28,911</u>	<u>74,046</u>
Total	\$62,691	\$553,862

## 2. Ribes Eradication in 1951

<u>National Park</u>	<u>First Working Acres</u>	<u>Second Working Acres</u>	<u>Other Workings Acres</u>	<u>Total Acres</u>	<u>Man-Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Days</u>		<u>Man-Days</u>	<u>Ribes</u>
Mount Rainier			710	710	530	12,000	.75	17
Glacier			460	460	610	25,000	1.33	54
Yellowstone		810	60	870	870	48,000	1.00	55
Rocky Mountain	<u>2,900</u>	<u>130</u>		<u>3,030</u>	<u>1,870</u>	<u>90,000</u>	<u>.62</u>	<u>30</u>
Total	2,900	940	1,230	5,070	3,880	175,000	.77	35



### 3. Gross Acreage Worked, 1930-1951

<u>National Park</u>	<u>First Working Acres</u>	<u>Second Working Acres</u>	<u>Other Workings Acres</u>	<u>Total Acres</u>	<u>Man- Days</u>	<u>Ribes</u>	<u>Per Acre</u>	
							<u>Man- Days</u>	<u>Ribes</u>
Mount Rainier	8,270	4,690	11,430	24,390	25,500	2,463,000	1.05	101
Glacier	5,140	3,620	3,510	12,270	13,430	1,308,000	1.09	107
Yellowstone	9,590	3,140	210	12,940	10,500	1,420,000	.81	110
Rocky Mountain	6,100	130		6,230	4,220	318,000	.68	51
Total	29,100	11,580	15,150	55,830	53,650	5,509,000	.96	99

### 4. Net Control Area Status

	First Working Acres	Second Working Acres	Other Workings Acres	Maintenance Acres	Unworked Acres	Control Area Acres
<u>National Park</u>						
Mount Rainier	4,500	4,300	11,220	3,330		4,500
Glacier	5,140	3,620	3,510	3,380		5,140
Yellowstone	9,590	3,140	210	7,130	3,510	13,100
Rocky Mountain	6,100	130		3,720		6,100
Total	25,330	11,190	14,940	17,560	3,510	28,840

SPREAD OF WHITE PINE BLISTER RUST  
SCOUTING IN MONTANA, WYOMING, IDAHO, AND COLORADO, 1951

By

J. C. Gynn and C. M. Chapman

White pine blister rust (*Cronartium ribicola*) continues to spread and intensify as shown by the discovery of infection on white pine for the first time in Powell County, Montana; Adams County, Idaho; and one new drainage in Yellowstone National Park. The disease on ribes was found for the first time in Fergus and Wheatland Counties, Montana; and Big Horn County, Wyoming.

WHITE PINE INFECTION LOCATIONS

1. Powell County, Montana: Lolo National Forest, upper Blackfoot drainage, T. 16 N., R. 7 W., sec. 18. The host *Pinus albicaulis* was infected with fruiting cankers in old wood, probably of 1941 origin.
2. Adams County, Idaho: Payette National Forest, Brundage Ridge, Payette River drainage, T. 19 N., R. 3 E., sec. 7. The host *P. albicaulis* had fruiting cankers on 1943 and 1944 wood. The infection was of 1945 origin.
3. Park County, Wyoming: Yellowstone National Park, Carnelian Creek drainage, in unsurveyed area. The host *P. albicaulis* was infected with one fruiting canker of 1945 origin on 1943-44 wood.

Blister rust on white pine was found for the first time in Park County, Wyoming, in Yellowstone National Park in 1950 in the vicinity of Mammoth Hot Springs.

RIBES INFECTION LOCATIONS

1. Fergus County, Montana; adjacent to Lewis and Clark National Forest: Timber Creek drainage 25 miles south of Lewistown, T. 11 N., R. 17 E., sec. 13. The infected host was *Ribes setosum*.
2. Wheatland County, Montana; adjacent to Lewis and Clark National Forest: Fish Creek drainage, 14 miles south of Harlowtown, T. 6 N., R. 15 E., sec. 31. The infected host was *R. setosum*.
3. Bighorn County, Wyoming: Bighorn National Forest, Shell Creek drainage, 40 miles southwest of Sheridan, T. 53 N., R. 90 W., sec. 11. The infected host was *R. setosum*.

All other infection found in 1951 was in the vicinity of previously reported infection centers.

No white pine blister rust has been found in Colorado up to 1951.





## SCOUTING SUMMARY, 1951

MONTANA, WYOMING, IDAHO, COLORADO

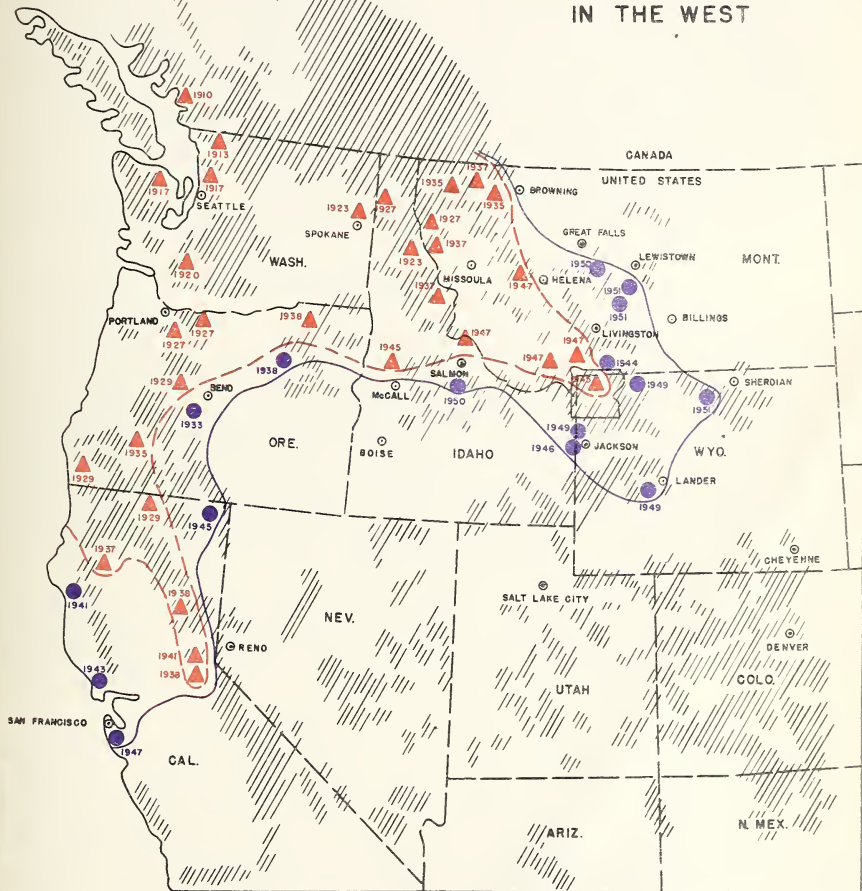
Forest Unit	Drainages Sampled	Ribes Examined	Pine Examined	New Ribes Infection Centers	New Pine Infection Centers
*Lewis & Clark N.F., Mont.	4	165	170	2	
**LoLo N.F., Mont.	1	10	10		*1
Yellowstone N.F., Wyo.	5	420	1,363		1
Shoshone N.F., Wyo.	2	112	17		
Bighorn N.F., Wyo.	2	38	30	1	
Medicine Bow N.F., Wyo.	4	104	21		
Washakie N.F., Wyo.	2	53	174		
Wyoming N.F., Wyo.	4	215	178		
Grand Teton N.F., Wyo.	5	1,349	487		
Teton N.F., Wyo.	2	32	50		
Targhee N.F., Wyo.	3	147	60		
Targhee N.F., Idaho	1	40			
Sawtooth N.F., Idaho	1	107	25		
Challis N.F., Idaho	2	157	65		
Boise N.F., Idaho	1	16			
Payette N.F., Idaho	1	70	75		1
Roosevelt N.F., Colorado	2	39	9		
Rocky Mt. N.F., Colorado	5	226	106		
Total	47	3,300	2,840	3	3

\*Adjacent to National Forest boundary

\*\*Found by U.S. Forest Service



# SPREAD OF BLISTER RUST IN THE WEST



## LEGEND

- ▲ (1910) PINE INFECTION AND YEAR OF ORIGIN
- (1951) RIBES INFECTION AND YEAR FOUND
- BOUNDARY OF INFECTION ON PINE
- BOUNDARY OF INFECTION ON RIBES
- //// WHITE PINE
- STATE LINES



## BLISTER RUST CONTROL, INLAND EMPIRE, 1951

By

Frank O. Walters, Assistant Project Leader

The 1951 blister rust control program was comparable to that of the three preceding years. The increasing demand for workers in lumbering and construction fields, and men entering the armed forces created a shortage of suitable workers. Intensive recruitment programs failed to secure the caliber of worker employed during the past two seasons. The Bureau maintained an 18-year minimum age limit, but the Forest Service was forced to drop the limit to 17 years to secure enough personnel. Few experienced men returned, adding to training difficulties and the filling of overhead positions. Contractors were scarce and work accomplishments by this means diminished. These factors were primary causes of the drop in the rate of production this year. Much of this year's effort was aimed at the cleanup of areas needing work at scattered locations in units close to maintenance, the objective being to complete necessary work on units in the present program as rapidly as possible so additional high priority areas now outside the present program could be included.

### Ribes eradication by chemical methods

With added experience in the use of chemical methods, more ribes situations are being attacked by this method. In cutover areas, logging roads and skid trails are being reopened by bulldozers so that both blower and power units mounted on 6x6 trucks can be used in the over-all treatment of logged-over areas. Two blower heads with better nozzles for introducing spray into the air streams have been developed. One head has three outlets which give a wide coverage to the immediate roadside. The other head delivers spray effectively from 30 to 40 feet back from the edge of the road. Used in combination, these heads are effective in the rapid treatment of cutover lands. In a logging operation primary disturbances are along skid trails and roads. It is here that ribes first appear in the greatest numbers and hence represent the greatest hazard.

The power sprayer follows the blower operations to handle concentrations of ribes back from the road and beyond the effective range of the blower. The utility of both the blower and power spray units was made greater by increasing the tank capacity and mounting the units on six wheel drive trucks, enabling their use on roads and skid trails which previously were not accessible.

Improved hose layouts and better nozzles have made both broadcast and selective operations much more efficient and effective. Checks made this season of areas resprayed a year ago show respray work to be very effective, thus indicating that a rapid initial broadcast spray with respraying the second season to be the most economical procedure. On the Cabinet operation, a power pumper was located at the creek well up in a steep drainage. The pumper was left in place, and the main line extended continuously along the contour, thus the main line gained in elevation over the stream bottom as the work progressed down the drainage. This enabled the crew to spray over 1/4 mile up the slope above the creek in a large part of the drainage. Another 10-chain area above with lighter ribes conditions was selectively treated with Hi-Fog units. Thus a major portion of the slope with heavy ribes populations was treated chemically at a fraction of the cost possible by other means.



The portable Bean-Cutler power sprayer was given wider use than previously. On the Kootenai and Kaniksu operations it was transported by mules into remote drainages, then moved as needed by hand into less accessible areas where heavy upland ribes concentrations were economically treated. These units have a capacity sufficient for three spray guns. They are easy to maintain and repair in the field and give steady, reliable service.

Accomplishment by helicopter was about the same as last year, 1,019 acres being treated. Frequent demands on the helicopter, under Forest Service contract for use on forest fires, prevented the treatment of all areas scheduled this year. After three seasons of observations, certain uses and limitations are apparent. (1) Operations are dependent upon favorable weather. (2) Low level flying seems essential for consistent effective kill of either brush or ribes. (3) Young ribes in the open are killed by aerial spray. (4) In areas of dense brush a minimum of three treatments will be necessary for ribes elimination. (5) Costs are reasonable. The cost per acre for treatment in 1950 was \$11.10. A \$3 per acre reduction in costs was realized in 1951. (6) An effective method to kill brush on areas preparatory to burning. (7) Effective for later treatment of the burned area to kill ribes seedlings and resprouting bushes. (8) It represents practically the only means of treating certain very difficult isolated situations.

#### Hand eradication

A difficult training task faced most camp superintendents this season. In order to secure adequate efficiency and production with the dragline method, considerable individual initial training as well as systematic follow-up training is necessary. Accomplishing this training with completely green crews of 25 to 45 men with insufficient assistance was tedious and prolonged. The season was well advanced before most crewmen reached top efficiency. Smaller camps, which would reduce the training load and increase the supervisory effectiveness of the camp superintendent, are a possible solution. The level of efficiency of hand eradication work remained high, but more rework of individual lots was required. Knapsack and Hi-Fog equipment was available to all hand eradication crews and their use was coordinated with hand eradication to achieve the greatest efficiency.

#### Checking

Checking work was well organized on all operations and many new checkers trained. In general, all necessary current checking was done and post checking information needed for planning was secured. The lots worked by ribes eradication crews can be checked without use of a compass which simplifies checking procedure. Compass training is given as the opportunity presents itself during the season.

#### Contract work

The scarcity of contractors was a handicap to this year's control program. This is the most economical means of accomplishing work on scattered areas in the current program plans. Most operations had contemplated an expansion of their contract work. Efforts will be made to increase the amount of work handled with contractors, but as long as the labor supply remains short, prospects of expansion are dim.





W-231

W-235

Two areas treated with 2,4,5-T spray by the broadcast method. Top picture shows effect of chemical on mature ribes 3 weeks after application. Lower picture one year after treatment shows completeness of kill.



### Effectiveness of control plot

In the fall of 1951, a 4,310-acre plot was partly established to study effectiveness of control. Most of the area within the plot is on maintenance. The area was heavily burned in 1917 a few years after it had been logged initially. It reverted to brush which has been slowly replaced and the area is now regenerating to white pine. This process has accelerated in recent years due to seed being cast by some of the trees now approaching pole size. The area can be described as open reproduction with most of the trees being less than 15 years old. The area to the east is unworked, and unworked land north and east from 1 to 2 miles distant at elevations rising above the plot carry heavy ribes concentrations. Moderate to light concentrations exist to the north, south, and west. Future logging will doubtless result in a heavy ribes establishment immediately north of the plot. Three north-south lines 1 mile apart and three east-west lines 60 chains apart were run through the plot. Altogether, 16 miles of strip were run. Stations marked by stakes were established every 5 chains. In 1952 five disease-free trees will be selected within a  $2\frac{1}{2}$ -chain radius of each stake and tagged for permanent identification. These trees will be examined periodically for evidence of rust. Over a period of years we should be able to determine the efficiency of present control standards both in normal years and wave years. The width of protection zones needed for protection against outside ribes concentrations can be appraised. In addition, a pine stocking-disease survey will be run along the established lines and rerun at intervals as a means of predicting the future pine stocking in such situations. Disturbed portions of the area will be closely watched to ascertain the ribes regeneration potential.

### Expression of responsibility by operators

Better forest practices by private operators are notable. Company officials and foresters are making an effort to conduct their cutting program so that it will complement the blister rust control efforts on their lands. Prior to initiation of control work, conferences are held with operators relative to cutting and silvicultural plans for the various areas. In most cases, seed sources are being left as well as sufficient residual timber to provide an intermediate cut. The following motion prepared by the Hazard Reduction Committee of the North Idaho Forestry Association, and passed at a recent meeting of that body, indicates the growing feeling of responsibility by the operators.

"That this Committee go on record as favoring the use of a sum of money not to exceed  $7\frac{1}{2}\%$  per thousand or 10%, whichever sum is less, of the Forest Management fund, and earmarked to be used as a private operator's contribution for insect and disease projects; said funds to be distributed or spent in the district from which they are collected. It is recommended that the State Cooperative Board of Forestry appoint a committee, of which the State Forester shall be chairman, within the respective districts, to determine how and when these monies shall be expended and to refer the recommendation back to the State Cooperative Board of Forestry for final action."



# RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date.

TABLE 1

## CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 INLAND EMPIRE

Item	Bureau of Entomology & Plant Quarantine					Forest Service BLR-4	Total
	BLR-1-4	Cooperative Control			Total		
		Federal BLR-3-4	State & Private	Total			
Salaries perm.	\$59,921	\$ 4,014		\$ 4,014	\$ 63,935	\$100,392	\$ 164,327
Sal. & Wages temp.		64,758	\$33,532	98,290	98,290	557,263	655,553
Contract ribes erad.		711	1,885	2,596	2,596	43,864	46,460
Subsistence supplies	1,133	12,178	2,757	14,935	16,068	162,711	178,779
Chemicals		3,298		3,298	3,298		3,298
Equipment	994	4,881		4,881	5,875	40,845	46,720
Travel and transp.	1,838	3,742		3,742	5,580	31,073	36,653
Other expenses	672	2,318	130	2,448	3,120	39,514	42,634
Total	\$64,558	\$95,900	\$38,304	\$134,204	\$198,762	\$975,662	\$1,174,424

TABLE 2

RIBES ERADICATION BY AGENCIES  
INLAND EMPIRE, 1951

Agency	State	Working	Acres	Man-Days	Ribes	Spray Gallons	Per Acre	
							Man- Days	Ribes
Bureau Cooperative	Idaho	First	2,880	2,840	702,000	62,570	.99	244
		Second	1,760	2,580	89,000	19,150	1.47	51
		Other	1,600	1,910	39,000	4,390	1.19	24
		Total	6,240	7,330	830,000	86,110	1.17	133
Forest Service	Idaho	First	980	1,280	145,000	14,310	1.31	148
		Second	11,420	10,090	253,000	27,960	.88	22
		Other	14,670	15,100	178,000	17,690	1.03	12
		Total	27,070	26,470	576,000	59,960	.98	21
	Montana	First	1,070	2,190	623,000	50,410	2.05	582
		Second	1,350	2,120	72,000	300	1.57	53
		Other	1,490	1,760	48,000	5,540	1.18	32
		Total	3,910	6,070	743,000	56,250	1.55	190
	Washington	Second	390	210	46,000	13,540	.54	118
		Other	3,650	2,810	70,000	3,880	.77	19
		Total	4,040	3,020	116,000	17,420	.75	29
	Total	First	2,050	3,470	768,000	64,720	1.69	375
		Second	13,160	12,420	371,000	41,800	.94	28
		Other	19,810	19,670	296,000	27,110	.99	15
		Total	35,020	35,560	1,435,000	133,630	1.02	41
T O T A L S		First	4,930	6,310	1,470,000	127,290	1.28	298
		Second	14,920	15,000	460,000	60,950	1.01	31
		Other	21,410	21,580	335,000	31,500	1.01	16
		Total	41,260	42,890	2,265,000	219,740	1.04	55

TABLE 2a

CONTRACT AND CHEMICAL WORK  
INLAND EMPIRE, 1951

Agency	Working	Contract Work Completed				Chemical Work			
		Number Contracts	Acres	Man-Days	Ribes	Amount Paid	Acres	Man- Days	Gallons
Bureau Cooperative	First						249	303	62,570
	Second						78	122	19,150
	Other	3	222	150	3,732	\$ 3,197.00	20	32	4,390
	Total	3	222	150	3,732	3,197.00	347	457	86,110
Forest Service	First	3	62	46	1,312	1,086.00	335	873	64,718
	Second	24	1,394	1,356	64,415	24,956.00	705	1,007	41,804
	Other	18	1,341	1,233	33,334	21,323.00	465	640	27,105
	Total	45	2,797	2,635	99,061	47,365.00	1,505	2,520	133,627
Total	First	3	62	46	1,312	1,086.00	584	1,176	127,288
	Second	24	1,394	1,356	64,415	24,956.00	783	1,129	60,954
	Other	21	1,563	1,383	37,066	24,520.00	485	672	31,495
	Total	48	3,019	2,785	102,793	\$50,562.00	1,852	2,977	219,737





TABLE 3

RIBES ERADICATION BY TYPES  
INLAND EMPIRE, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Bureau Cooperative	Burn 1940-49		60		60
	Cutover 1940-49	1,160	980		2,140
	Cutover 1920-39			1,050	1,050
	Reproduction 1910-39		580	170	850
	Pole	1,720		110	1,830
	Stream		40	270	310
	Total	2,880	1,760	1,600	6,240
Forest Service	Plantation 1950-54	300			300
	Plantation 1940-49		210	4,450	4,660
	Cutover 1940-49	250	570	160	980
	Cutover 1920-39		950	510	1,460
	Reproduction 1910-39	570	3,050	8,260	11,880
	Pole	670	7,840	5,700	14,210
	Mature	150	190	40	380
	Stream	110	350	690	1,150
	Total	2,050	13,160	19,810	35,020
Total	Plantation 1950-54	300			300
	Burn 1940-49		60		60
	Plantation 1940-49		210	4,450	4,660
	Cutover 1940-49	1,410	1,550	160	3,120
	Cutover 1920-39		950	1,560	2,510
	Reproduction 1910-39	570	3,730	8,430	12,730
	Pole	2,390	7,840	5,810	16,040
	Mature	150	190	40	380
	Stream	110	390	960	1,460
	Total	4,950	14,920	21,410	41,260

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
INLAND EMPIRE, 1951

State	Working	Number of Acres Worked												GRAND TOTAL
		By Forest Service				By Bureau of Entomology and Plant Quarantine				Total Federal	Total Other			
		National Forest	State	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total	
Idaho	First	860	30	90	980	770	50	2,060	2,880	1,630	80	2,150	2,230	3,860
	Second	10,600	300	520	11,420	190	470	1,100	1,760	10,790	770	1,620	2,390	13,180
	Other	12,070	1,650	970	14,670	150	180	1,270	1,600	12,220	1,610	2,240	4,050	16,270
	Total	23,530	1,960	1,580	27,070	1,110	700	4,430	6,240	24,640	2,660	6,010	8,670	33,310
Montana	First	1,070			1,070					1,070				1,070
	Second	1,350			1,350					1,350				1,350
	Other	1,490			1,490					1,490				1,490
	Total	3,910			3,910					3,910				3,910
Washington	Second	350		40	390					350		40	40	390
	Other	3,650			3,650					3,650				3,650
	Total	4,000		40	4,040					4,000		40	40	4,040
Total	First	1,930	30	90	2,050	770	50	2,060	2,880	2,700	80	2,150	2,230	4,930
	Second	12,300	300	560	13,160	190	470	1,100	1,760	12,490	770	1,660	2,430	14,920
	Other	17,210	1,650	970	19,810	150	180	1,270	1,600	17,360	1,810	2,240	4,050	21,410
	Total	31,440	1,960	1,620	35,020	1,110	700	4,430	6,240	32,550	2,660	6,050	8,710	41,260



TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
INLAND EMPIRE, 1923-1951

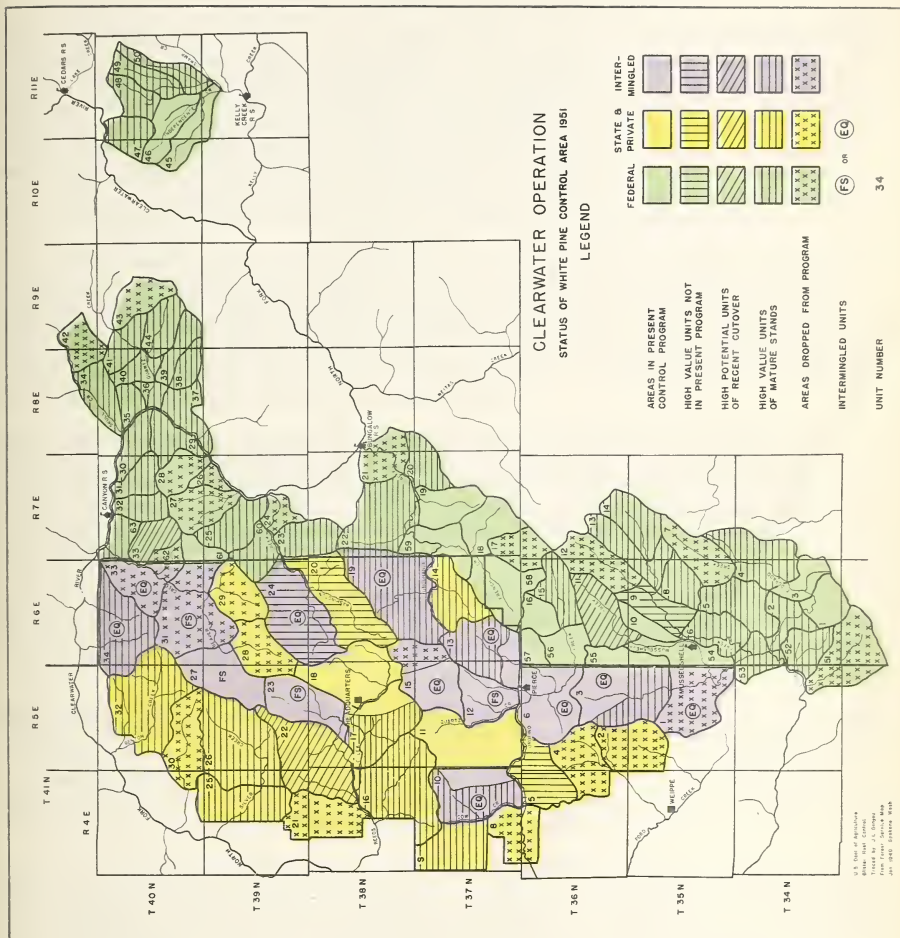
State	Class	Workings				Man-Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Idaho	Ex-Coop.	223,000	79,000	56,000	358,000	216,000	31,736,000	425,000	.60	89
	Ex-Emerg.	399,000	104,000	12,000	515,000	404,000	96,874,000	214,000	.78	188
	FS-Reg.	249,000	213,000	122,000	584,000	602,000	88,842,000	640,000	1.03	152
	FS-Emerg.	305,000	32,000	1,000	348,000	216,000	56,636,000	125,000	.64	168
	CCC	518,000	65,000	7,000	590,000	661,000	123,729,000	656,000	1.12	210
	Total	1,694,000	493,000	198,000	2,385,000	2,099,000	397,817,000	2,060,000	.88	167
Montana	Ex-Coop.	1,000	1,000		2,000	5,000	762,000	35,000	1.50	381
	Ex-Emerg.	64,000	1,000	1,000	66,000	31,000	5,775,000	1,000	.47	88
	FS-Reg.	38,000	17,000	7,000	62,000	74,000	6,767,000	123,000	1.19	109
	FS-Emerg.	34,000	2,000		36,000	36,000	7,368,000	22,000	1.00	205
	CCC	13,000	1,000		14,000	13,000	1,472,000		.93	105
	Total	150,000	22,000	8,000	180,000	157,000	22,144,000	181,000	.87	123
Washington	Ex-Emerg.	48,000	13,000	4,000	65,000	63,000	17,826,000		.97	274
	FS-Reg.	26,000	29,000	16,000	71,000	58,000	11,734,000	60,000	.82	165
	FS-Emerg.	35,000	2,000		37,000	14,000	4,014,000		.38	108
	CCC	20,000	2,000		22,000	25,000	3,487,000		1.14	159
	Total	123,000	46,000	20,000	195,000	160,000	37,061,000	60,000	.82	190
Totals	Ex-Coop.	224,000	80,000	56,000	360,000	219,000	32,498,000	460,000	.61	90
	Ex-Emerg.	511,000	118,000	17,000	646,000	498,000	120,475,000	215,000	.77	186
	FS-Reg.	313,000	259,000	145,000	717,000	734,000	107,343,000	823,000	1.02	150
	FS-Emerg.	374,000	36,000	1,000	411,000	266,000	68,013,000	147,000	.65	165
	CCC	551,000	68,000	7,000	626,000	699,000	126,682,000	656,000	1.12	206
	Total	1,973,000	561,000	226,000	2,760,000	2,416,000	457,022,000	2,301,000	.88	166

TABLE 6

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
INLAND EMPIRE 1923-1951

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	247,000	287,000	101,000	1,235,000	245,000	1,092,000
	Public Domain	15,000	6,000	3,000	24,000	14,000	29,000
	Subtotal Federal	862,000	293,000	104,000	1,259,000	259,000	1,121,000
	State	219,000	68,000	27,000	314,000	138,000	357,000
	Private	347,000	113,000	43,000	503,000	363,000	710,000
	Subtotal S & P	566,000	181,000	70,000	817,000	501,000	1,067,000
	Total	1,428,000	474,000	174,000	2,076,000	760,000	2,188,000
Montana	National Forest	128,000	18,000	6,000	152,000	47,000	175,000
	State		1,000		1,000		1,000
	Private	18,000	3,000	2,000	23,000	14,000	32,000
	Subtotal S & P	19,000	3,000	2,000	24,000	14,000	33,000
	Total	147,000	21,000	8,000	176,000	61,000	208,000
Washington	National Forest	90,000	32,000	16,000	138,000	30,000	120,000
	State	2,000			2,000		2,000
	Private	5,000	2,000	1,000	8,000	4,000	9,000
	Subtotal S & P	7,000	2,000	1,000	10,000	4,000	11,000
	Total	97,000	34,000	17,000	148,000	34,000	131,000
Total	National Forest	1,065,000	337,000	123,000	1,525,000	322,000	1,387,000
	Public Domain	15,000	6,000	3,000	24,000	14,000	29,000
	Subtotal Federal	1,080,000	343,000	126,000	1,549,000	336,000	1,416,000
	State	222,000	68,000	27,000	317,000	138,000	360,000
	Private	370,000	118,000	46,000	534,000	381,000	751,000
	Subtotal S & P	592,000	186,000	73,000	851,000	519,000	1,111,000
	Total	1,672,000	529,000	199,000	2,400,000	855,000	2,527,000









## BLISTER RUST CONTROL, CLEARWATER OPERATION, 1951

By

M. C. Riley, Operation Supervisor  
H. J. Faulkner, Assistant Operation Supervisor  
D. J. Moore, Forester, U. S. Forest Service

The 1951 program consisted of five Forest Service and two Bureau of Entomology and Plant Quarantine camps. In addition to the regular crews, the Bureau awarded one ribes eradication contract on a competitive bid basis. The first camp was opened on June 4 and the last camp closed on September 7. The peak employment was 229 workers. Exceptionally favorable weather prevailed during the entire field season which permitted taking full advantage of the 48-hour work week. Due to the delayed assignment of a new Forest Service staffman to the operation, the Bureau assistant operation supervisor was detailed to manage the Forest Service blister rust work from July 1 to September 30.

The labor situation was not as favorable as in the past few years. Full contingents of personnel were secured at the start of the season but few experienced men were available, especially for overhead and checking positions. More than the usual labor turnover occurred in the Bureau camps because of the many local opportunities for higher pay. Workers were unstable due to conditions affecting their future plans and as a result, acceptable performance was less than that secured during the past 2 years.

The ribes eradication contracting phase of the program did not develop as had been expected. Some experienced Clearwater contractors were awarded bids on other operations. Available experienced contractors and others who might have been interested were reluctant to take the risks involved when there was the opportunity to work overtime and the possibility of getting called for fire duty with the attendant higher income.

Forest Service camps spent 1,008 man-days on fires at a time when their production was highest. All available Bureau employees were called for fire duty by the Forest Service for periods lasting from 1 to 2 days. This resulted in the usual loss of crew efficiency.

Cooperative Camps on State and Private Lands. The Bureau program on state and private lands consisted of one 35-man camp at Blister Rust Control Headquarters in Hildebrand Unit No. 6 near Pierce, Idaho, one 50-man camp on Reed's Creek in Calhoun Unit No. 17 near the Clearwater Timber Protective Association Headquarters, one contract in Jayne Unit No. 11, and a small amount of roadside work with the Buffalo turbine blower in Brown's Creek Unit No. 3.

Work in Unit 6 consisted of second working on Hildebrand Creek and Mutton Gulch. With the exception of a 60-acre area of 1947 burn, this was all cutover between 1941 and 1943. Since the white pine seed source is barely adequate for restocking, timing the ribes eradication is very important. Work performed this season was in accordance with proper planning. Only stream type was worked in that portion of Mutton Gulch where the post check indicated no upland ribes. In conjunction with the regular hand eradication methods, there were several portions varying in size from  $\frac{1}{2}$  acre to 4 acres where chemical was applied with the power sprayer. Knapsack sprayers were used in stream type where feasible. The 60-acre

burn on Hildebrand Creek was given a broadcast treatment with the power sprayer. All chemical work was done on ground where the ribes were small and numerous, which made hand eradication impracticable. This condition represented the principal ribes areas in the vicinity. An appreciable saving was effected by the use of chemical in current season work and reduced the number of future workings necessary. The Hildebrand-Mutton Gulch area is a very important part of the unit which merits top consideration and work accomplished this year keeps this unit on planned schedule with the exception of approximately 100 acres which could not be completed because of early loss of workers. All work in this area meets maintenance standards but since the ground has not been logged for a sufficient period to become stabilized, a post check will be necessary.

In Unit 17, third working was performed in the 1939 cutover type along the South Fork of Reeds Creek and in 1929 and 1930 cuttings in the North Fork of Reeds Creek west of the main highway from Association Headquarters to the town of Headquarters. On the older cutting, the work resulted in a considerable portion being placed on maintenance, the exceptions being some moist spots with heavy brush cover and a ski area recently cleared and badly disturbed. In the younger cutting the logging was too recent to allow the area to be placed on maintenance although that standard was achieved. Unless further disturbances occur, this will be the last working in this very accessible area where white pine reproduction is already well established and blister rust has taken so little toll that a very good volume can be realized at maturity. The only chemical work feasible was in a few small scattered patches where suppressed bushes were treated by means of the knapsack sprayer. The area worked in this unit lies immediately adjacent to areas covered during the past two seasons and follows the planned progress in one of the best units on Association lands.

The contract area in Unit 11 is in an excellent stand of reproduction in a 1934 cutting. A heavy ground cover of fern made working conditions rather severe, however, a very good quality of performance was secured and no further work should be necessary. This small area was one of four pieces which had been planned for contracting in the Hollywood vicinity and would have completed the work for the general area except for stream type or for areas which may regenerate to ribes due to future disturbances. This is the best stand of reproduction on Association lands. It can be most economically handled by contracting since there is not enough work for a camp and considerable time would be involved traveling from any future camp in this vicinity.

The Buffalo turbine blower was used in Unit 3 on 8 miles of logging road where ribes were especially numerous. No other work has been done in this portion of the unit but initial working is planned for next season. At this time, the treated area will be clearly defined and eradication can be speeded up by doing any necessary mop-up work where the blower was used.

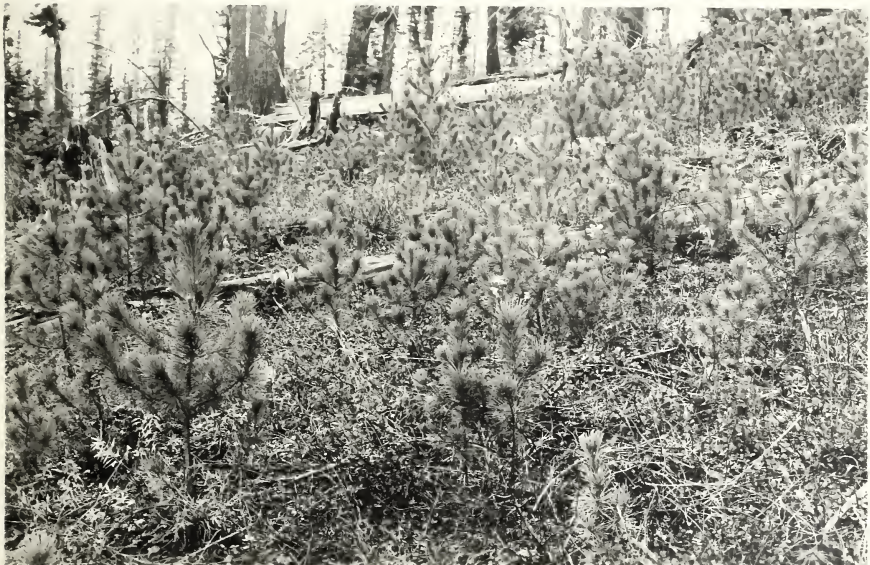
Forest Service Camps on Federal Lands. The Forest Service program consisted of four 30-man camps and one 15-man camp. The camp on Orofino Creek performed first, second, and third workings in the upper Orofino Creek drainage which includes Units 15, 16, 56, and 57. These units comprise all of the control area in the drainage within the National Forest boundary and are immediately adjacent to Bureau Unit 6. The combined units make a large block of very accessible area with an extremely high potential for white pine production. The work this year was





Mutton Gulch, Clearwater Timber Protective Association, near Pierce, Idaho.

W-76



Hildebrand Creek, Clearwater Timber Protective Association, near Pierce, Idaho. Areas logged in 1945. White pine seed source is barely adequate necessitating proper timing of ribes eradication to save first crop. A white pine reproduction. Ribes eradicated in 1948 and again where needed in 1951. Present infection less than 10 percent.

W-80







W-1886-3

Beaver Creek Plantation, Clearwater National Forest, Unit 27. Broadcast burned in 1936 and planted in 1937. First ribes eradication was performed in 1938. Heavy germination of ribes caused severe pine infection before ribes could be completely removed.



W-1886-7

The same area in 1950, 13 years after planting, now on maintenance.





primarily in the 40- to 60-year-old pole stand on Rosebud Creek. Very difficult working was encountered near the Orofino-Trench Creek divide where the stream fans out into large alder patches. Considerable Ribes petiolare occurred along the main stream and was treated with 2,4,5-T chemical applied with Hi-Fog guns. Logging has been carried on in these units for the past 6 years with several years' cutting remaining. A 30-man camp will be required next year to perform first and second workings on the cutover areas. Chemical applied with both power and knapsack units can be used to advantage in the eradication of upland ribes.

Two camps were used on Moose Creek in Units 45 and 46. They were located close together and shared a common mess hall with the crews working separate divisions of the units. These units are composed of reproduction stands following a 1910 burn on lower Independence and Moose Creeks and a 40- to 60-year-old pole stand around the old Moose City location and on lower Deadwood Creek. The objective of the 1951 program was to complete the work of protecting the pole and reproduction stands. Due to loss of time on fire and considerable labor turnover, a 25-man camp will be required for approximately 6 weeks next season to complete the work. The reproduction stands have suffered severe damage from blister rust. However, considerable new stocking is appearing in the openings and with the fill-in planting of 220 acres which was done this year it is felt that a good stand of white pine can be produced. Numerous ribes are present in the upper reaches of the Moose Creek drainage which pose a threat to the balance of the drainage. The spread of the rust down Moose Creek should be carefully watched to determine if present protection zones are adequate.

The camp on Alder Creek performed third working in pole stands and plantations in Units 23 and 27. This working should afford protection for the Beaver Creek plantation. The plantation on Alder Creek will require additional work in 1953 for complete protection. The pole stand adjacent to the plantations will require additional work due to new ribes germination caused by disturbances from scattered wind throw.

The Sylvan Saddle camp located in Unit 18 was originally planned as a 5-man spray unit but was expanded to a 15-man crew to do both hand and chemical work. The purpose was to extend the protection zone on the east side of the Sylvan Creek plantation. Heavy brush resulting from an old single burn supporting numerous ribes presented a difficult eradication problem. Due to inaccessibility, heavy brush, and windfalls, power spraying was not practical. Chemical applied with back-pack units was used to good advantage on the heavier concentrations of R. lacustre and R. viscosissimum. To save time some scattered large ribes that would have been difficult to grub out were decapitated and the crowns were treated with 2,4,5-T chemical.

Supervision and training of the checking personnel were under the direction of the assistant operation supervisor. The 11 checkers employed on the operation were able to check all of the current eradication work and do some post check and advance survey. The standard checking procedure was applied to all areas inspected. On the Clearwater operation it is a function of the checkers to lay lane and lot lines. A continuation of the checking method study initiated in 1950 was conducted to evaluate the accuracy and adequacy of post check and regular check

following the lot method of ribes eradication. This study was made on 100 acres in Mutton Gulch. The results and conclusions will be reported separately.

White pine stocking and disease survey activities were limited to gathering data to supplement existing information for the possible refinement or extension of the unit analysis material. Forest Service crews gathered additional data in upper French Creek and Bureau crews secured more information for the Quartz Creek and Weaver Creek drainages.

There have been no recent developments which would materially change the situation on lands of the Clearwater Timber Protective Association in respect to the inadequacy of the present program to provide protection for all the excellent areas. It is still necessary to concentrate blister rust control work on less than 40 percent of the high priority association lands. This year it was not possible to undertake any initial working on these lands and maintain orderly progress on areas where work was already started although next year it is planned to do initial work in the Browns Creek cutting. Practically all of the eradication performed this year reduced the ribes population to maintenance standards but approximately 60 percent of this has been disturbed too recently to be placed in that status permanently. Salvage logging by small operators on individual pieces of ground may, in some instances, cause additional workings beyond that ordinarily planned. In Mutton Gulch where the original cutting was heavy, it is not expected that the new disturbances will have an appreciable effect. On Rhodes Creek and Orofino Creek where a second cut is being made in heavy residual stands, additional workings may be necessary to remove new ribes.

On the Clearwater National Forest the status of the work is in a more favorable condition. The program has been adequate for proper timing of workings on the best units and with the prospect of accelerated cutting, the additional work there will balance with the amount of work expended on areas now on maintenance. The ribes eradication performed this season resulted in at least 75 percent of the area worked being placed on maintenance. Practically all of the work reduced the ribes to these standards but some areas such as the Beaver Plantation, have been disturbed too recently to become completely stabilized. For the operation as a whole, there is still more land being removed from the maintenance category because of cutting than is being added.

## RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951  
CLEARWATER OPERATION

Item	Bureau of Entomology & Plant Quarantine					Forest Service BLR-4	Total
	BLR-1-4	Cooperative Control			Total		
		Federal	State & Private	Total			
Salaries, perm.	\$12,739	\$ 1,854		\$ 1,854	\$14,593	\$ 29,331	\$ 43,924
Sal. & wages, temp.		25,874	\$15,460	41,334	41,334	78,381	119,715
Contract robes erad.			688	688	688		688
Subsistence supplies		5,432	558	5,990	5,990	26,520	32,510
Chemicals		538		538	538		538
Equipment		1,562		1,562	1,562	1,789	3,351
Travel and transp.	438	975		975	1,413	2,182	3,595
Other expenses	306	971	19	990	1,296	4,470	5,766
Total	\$13,483	\$37,206	\$16,725	\$53,931	\$67,414	\$142,673	\$210,087



TABLE 2

RIBES ERADICATION BY AGENCIES  
CLEARWATER OPERATION, 1951

Agency	State	Working	Acres	Man-Days	Ribes	Spray Gallons	Per Acre	
							Man-Days	Ribes
Bureau Cooperative	Idaho	Second	1,080	1,350	35,900	19,150	1.25	33
		Other	880	1,420	23,100	100	1.61	26
		Total	1,960	2,770	59,000	19,250	1.41	30
Forest Service	Idaho	First	550	450	12,300	10	.82	22
		Second	610	350	23,700		.57	39
		Other	4,690	3,310	50,000		.71	11
		Total	5,850	4,110	86,000	10	.70	15
T O T A L S		First	550	450	12,300	10	.82	22
		Second	1,690	1,700	59,600	19,150	1.00	35
		Other	5,570	4,730	73,100	100	.85	13
		Total	7,810	6,880	145,000	19,260	.88	19

TABLE 2a

CONTRACT AND CHEMICAL WORK  
CLEARWATER OPERATION, 1951

Agency	Working	Contract Work Completed				Chemical Work		
		Number Contracts	Acres	Man-Days	Ribes	Amount Paid	Acres	Man-Days Gallons
Bureau Cooperative	Second						78	122 19,150
	Other	1	52	40	732	\$688.00	10	10 100
	Total	1	52	40	732	688.00	88	132 19,250
Forest Service	First						13	4 8
	Second						13	4 8
	Other	1	52	40	732	688.00	10	10 100
Total	Total	1	52	40	732	\$688.00	101	136 19,258

TABLE 3

RIBES ERADICATION BY TYPES  
CLEARWATER OPERATION, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Bureau Cooperative	Burn 1940-49		60		60
	Cutover 1940-49		980		980
	Cutover 1920-39			880	880
	Stream		40		40
	Total		1,080	880	1,960
Forest Service	Plantation 1950-54	220			220
	Cutover 1940-49		270		270
	Reproduction 1910-39			1,070	1,070
	Fole	320	340	3,620	4,280
	Stream	10			10
	Total	550	610	4,690	5,850
Total	Plantation 1950-54	220			220
	Burn 1940-49		60		60
	Cutover 1940-49		1,250		1,250
	Cutover 1920-39			880	880
	Reproduction 1910-39			1,070	1,070
	Fole	320	340	3,620	4,280
	Stream	10	40		50
	Total	550	1,690	5,570	7,810





TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
CLEARWATER OPERATION, 1951

State	Working	Number of Acres Worked									
		By Forest Service		By Bureau of Entomology and Plant Quarantine			Total Federal	Total Other			GRAND TOTAL
		National Forest	Total	State	Private	Total	National Forest	State	Private	Total	
Idaho	First	550	550				550				550
	Second	610	610	290	790	1,080	610	290	790	1,080	1,690
	Other	4,690	4,690		880	880	4,690		880	880	5,570
	Total	5,850	5,850	290	1,670	1,960	5,850	290	1,670	1,960	7,810

TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
CLEARWATER OPERATION, 1929-1951

State	Class	Workings				Men- Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man- Days	Ribes
Idaho	Ex-Coop.	36,000	18,000	18,000	72,000	69,000	9,175,000	273,000	.96	127
	Ex-Emerg.	82,000	47,000	5,000	134,000	125,000	30,398,000	137,000	.93	227
	FS-Reg.	87,000	36,000	29,000	154,000	133,000	30,745,000	195,000	.86	200
	FS-Emerg.	44,000	11,000	1,000	56,000	45,000	14,895,000	24,000	.80	266
	CCC	165,000	21,000	1,000	187,000	166,000	32,242,000	408,000	.89	172
	Total	414,000	135,000	54,000	603,000	538,000	117,455,000	1,037,000	.89	195

TABLE 6

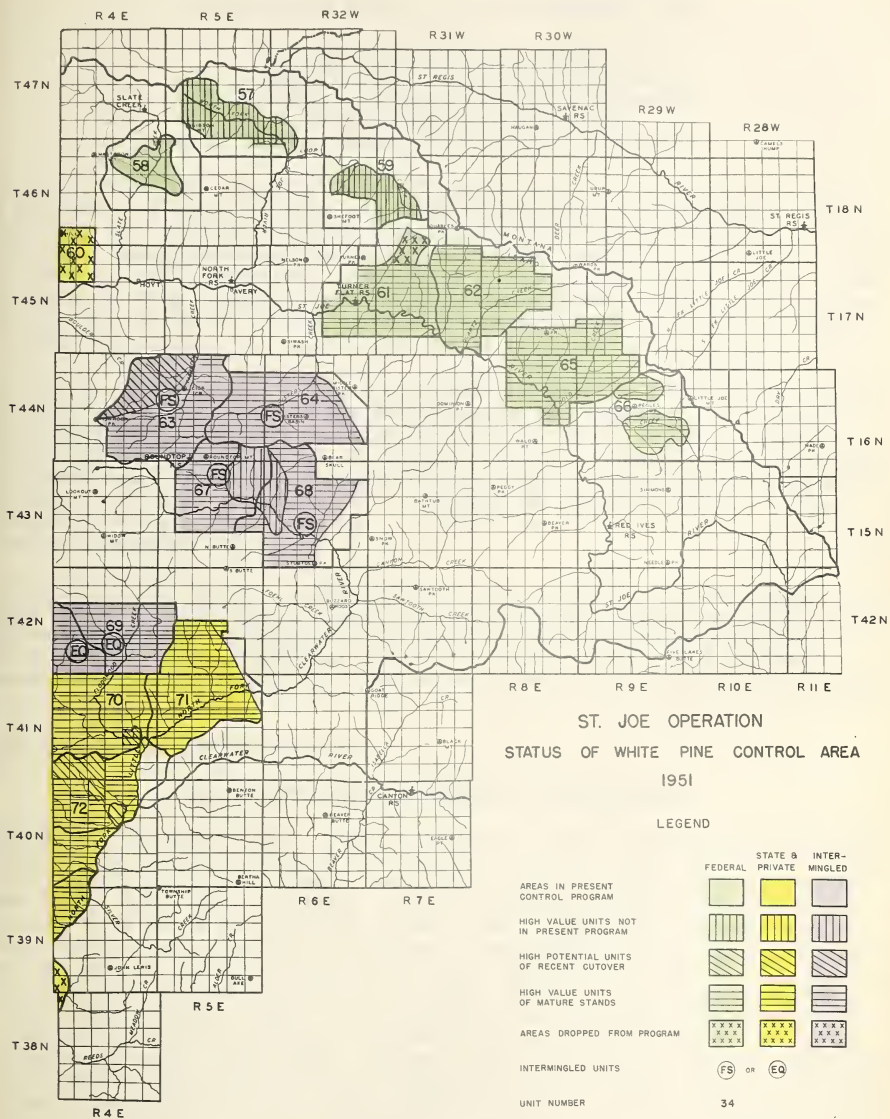
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
CLEARWATER OPERATION, 1929-1951

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	154,000	61,000	27,000	242,000	46,000	200,000
	Public Domain	4,000	1,000		5,000		4,000
	Subtotal Federal	158,000	62,000	27,000	247,000	46,000	204,000
	State	58,000	16,000	4,000	78,000	33,000	91,000
	Private	133,000	47,000	20,000	200,000	60,000	193,000
	Subtotal S & P	191,000	63,000	24,000	278,000	93,000	284,000
	Total	349,000	125,000	51,000	525,000	139,000	488,000













## BLISTER RUST CONTROL, ST. JOE OPERATION, 1951

By

H. J. Hartman, Operation Supervisor  
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The present program comprises 18 Forest Service units of 139,000 acres and 7 Bureau units of state, private, and intermingled lands of 59,000 acres. These units all support immature stands which can be protected with the funds now being allotted. Additional area from units now deferred, due to lack of funds, will be added as work is completed on the units in the present program. At the close of the 1951 field season, 40 percent of the lands in Bureau units and 43 percent of the lands in Forest Service units were on maintenance. Blister rust control work is being closely coordinated with timber management planning and practices.

The Bureau of Entomology and Plant Quarantine operated two 50-man camps located on state and private lands in the Badger Meadows and Cameron Creek drainage. The Forest Service financed and administered eight 45-man camps on National Forest lands on Meadow, Corral, Cedar-Blair, Potlatch, Cougar, and Bussel Creek drainages plus a ribes eradication contract program. The work season averaged  $2\frac{1}{2}$  months per camp. A majority of the workers was college students. At the peak of employment, there were 340 employees in the 8 Forest Service camps and 100 in the 2 Bureau camps.

Blister rust control work was disrupted by fire fighting duty during August. Time lost from eradication projects resulted in several camp areas not being completed. Fire fighting activities resulted in a loss of 2,144 man-days from Forest Service camps and 210 man-days from Bureau projects. These losses amounted to 16.2 percent of the total man-days available for blister rust control work.

All control work was concentrated on the following units:

### Cooperative Camps on State and Private Lands

Badger Meadows, Unit No. 28. Immature stands of 1,200 acres, recent cutover of 6,000 acres, and 8,190 acres of uncut mature, comprise the 15,390 acres of this unit. Annual cutting has taken place on this unit since 1937. Recent cuttings are mainly of the seed tree type. Volumes removed at initial cutting average from 60 to 80 percent of the total volume. Small blocks are clear-cut when sound trees of good vigor are not present. The residual stand will be harvested as soon as white pine reproduction has become well established. All dangerous slash is being disposed of annually. A heavy loss from wind throw is taking place in the residual stands. Ribes regeneration following logging varies from a few scattered ribes seedlings to 10,000 ribes seedlings per acre. In 1951, Bureau crews worked 1,580 acres. All work areas supporting heavy concentrations of ribes were treated with 2,4,5-T chemical by means of power sprayer and turbine blower. The long range plan is to maintain this unit in white pine production; close cooperation is being maintained with the operator to insure continuance of the plan. The entire unit will be progressively worked 3 to 4 years subsequent to logging operations.

Cameron Creek, Unit No. 29. There are 7,500 acres of immature and 5,000 acres of mature white pine in this unit. Most of the land now supporting immature stands was logged and broadcast burned between 1911 and 1921. The immature stands have been worked twice and some for the third time. In 1951, a 260-acre block of immature white pine was worked for the second time. The worked area averaged 1.95 man-days and 50 ribes per acre. Work in this unit has been completed for the present. A post check in 2 to 3 years will determine if additional work is needed on the unit.

A 255-acre block of immature white pine in the adjacent lower Elk Creek Unit No. 35 was worked to extend the protective zone of the Cameron Creek unit. The worked area averaged 1.96 man-days and 143 ribes per acre.

#### Forest Service Camps on Federal Lands

Meadow Creek, Unit No. 4. This unit contains 10,880 acres of which 7,940 acres are recent cutover on which all work has been deferred. The 2,940 acres of pole on Blakes Fork is the only portion of the unit which is in the present program but adjoins the protected area of the east fork of Meadow Creek unit. In 1951, 1,182 acres were worked for the second time. A power sprayer was used to spray the heavy stream type ribes on recently logged areas on Meadow Creek. Eight hundred acres have been worked to maintenance standards. One camp will complete the required work on this unit in 1952.

Corrall Creek, Unit No. 14. Practically all of this unit was partially logged or clear-cut and broadcast burned in the early twenties. The present stand is a mixed age class. Most of the clear-cut and broadcast burned areas now support a good stand of white pine reproduction. The partially cut areas support a heavy residual stand of mature grand fir which must be harvested before reproduction of any species can become established. In 1951, the crews worked 1,120 acres for the second time and 700 acres for the third time. The second working averaged .82 man-day and 5 ribes per acre while third working averaged 1.04 man-days and 3 ribes per acre. No ribes seedlings were found on the area. Of the 6,400 acres in this unit, 2,828 acres are on maintenance. All current work on this unit has been completed until a post check indicates the need for additional work.

Cedar-Blair Creek, Unit No. 24. This unit supports 9,220 acres of immature stands, most of which is advanced pole. There are 900 acres of low value area which has never been worked. The remaining 8,320 acres have been worked two or more times. Three thousand seven hundred and eighty acres have been placed on maintenance. Some logging is being done in the advanced pole stands. In 1951, crews worked 344 acres of open reproduction in the head of Cedar Creek.

Potlatch Creek, Unit No. 25. This 14,050-acre unit once supported an excellent stand of mature white pine which was logged between 1909 and 1927. Most of the unit was clear-cut and broadcast burned. The unit now supports 10,200 acres of white pine reproduction and pole. The immature stands have been worked two times and portions three or more times. As a result of these workings, 6,100 acres have been worked down to maintenance standards. Due to low values, 3,850 acres remain unworked. In 1951, 1,466 acres of immature were reworked. One camp will complete the presently required work on this unit in 1952.



W-286

Logging operations of Potlatch Lumber Co. in 1909. Log storage pond of old camp No. 7 dam on Moose Creek near Bovill, Idaho. Mature stand in background is typical of the early-day western white pine belt of northern Idaho.



W-246

Log storage pond of old camp No. 7 dam on Moose Creek as it appeared in 1951, 42 years after first logging operations. Western white pine has been restored to its former dominance in the type as evidenced by the well-stocked pine stand in the background. The original stand was clearcut and broadcast burned. Ribes regeneration was extremely light.







W-223

Bulldozer reconstructing cat road for power spray operations. East fork of Potlatch Creek 1947 logging area.



W-58

Spraying ribs along cat road in cutover area with Buffalo turbine blower. East fork of Potlatch Creek 1947 logging area.





Cougar Creek, Unit No. 26. This unit contains approximately 4,200 acres of reproduction and pole which regenerated on clear-cut lands broadcast burned in 1923. The upper limits of this unit are poorly stocked and support a very dense stand of brush and ribes which has never been worked. The better stocked portion of the unit has been worked twice and some portions for the third time. Some 1,550 acres have been worked down to maintenance standards. White pine reproduction continues to come in on the worked area. A total of 1,744 acres was worked in 1951. The remaining 320 acres requiring rework will be completed in 1952.

Bussell Creek, Unit No. 42. There are 7,200 acres of white pine reproduction and pole in this unit. Most of the unit was clear-cut and broadcast burned between 1920 and 1931. The areas that supported overmature white pine at the time of logging have been very slow to restock to any tree species. The immature stands have been worked three times and portions for the fifth time. This unit has been the most difficult on which to attain permanent ribes suppression. Ribes lacustre seedlings are still occurring along seepages and on damp slopes. There were 2,738 acres reworked in 1951. Two camps will complete the required rework on the area in 1952.

Contract work. All ribes eradication contract work was confined to the Ramskull, Charlie, and Hattan Creek drainages and was financed and directed by the Forest Service. During 1951, work was completed on nine contracts totaling 690 acres at a total cost of \$16,483.61. The average bid price per acre was \$23.89. Nearly all contract areas represented very difficult working conditions. An attempt was made to expand contract work in 1951, but additional persons interested in contract work could not be found. Several sets of bid invitations were issued but failed to attract a single bidder. Areas totaling 1,250 acres have been surveyed for Forest Service contract work and are to be advertised early in 1952.

Methods and equipment. The one-man dragline method for hand eradication of ribes was employed in all camps. Workers were divided into crews from six to eight men with a straw boss in charge.

Two hundred and fifty-nine acres of heavy ribes concentrations along streams and on recently cutover areas were treated by chemical methods. A bulldozer was used to reconstruct the 15 miles of logging roads and skid trails on the areas treated by the turbine blower and power sprayers. Reconstruction must be reasonably cheap and have a gradient of less than 25 percent. Two Bean power sprayers, a Buffalo turbine blower, and knapsack sprayers were used to apply 2,4,5-T. The Bean power sprayers were used to broadcast spray the chemical on the cutover areas. One man-day per acre was required to apply 303 gallons per acre.

The Buffalo turbine blower was used to spray roadside ribes on a 105-acre block of cutover area. The chemical solution used was 1 gallon of 2,4,5-T ester to 75 gallons of water. The turbine blower traveled at the rate of 2 miles per hour. Each side of the cat road was given two applications. The second application was made while traveling the opposite direction. The double treatment made it possible to obtain a more complete coverage and a maximum width of treated area. The area between the roads that could not be reached by the turbine blower was worked by hand eradication crews.

Chemical eradication by the turbine blower on upland areas is limited to those areas which support heavy concentrations of ribes confined mainly along roads.

Checking. Standard procedures as outlined in the 1949 checking manual continued to serve as a guide for all regular and post check. Modifications for both types of checking were sometimes necessary due to varying field conditions. In post check work, strips were frequently run at a 4- instead of a 5-chain interval to provide the 12 to 15 percent sample check needed on certain areas.

Three experienced checkers of the 15 who checked in 1950 were available for the 1951 season. Better paying jobs and inductions into the armed forces were responsible for the heavy loss in trained personnel prior to June 1.

During the summer, 12 recruits were selected from the experienced eradication personnel and trained in checking procedures. The quality of personnel available as trainees was definitely below that of previous seasons.

The supervision and training of all checking personnel were under the direction of the assistant operation supervisor. A checker foreman, employed by the Forest Service, assisted in the work. The constant demand for regular and post check information prevented checkers from assisting in any other phases of control work.

A total of 17,700 acres was checked: 7,000 acres were the 1951 season's eradication work area and 10,700 acres were inspections of post check and maintenance area.

Control status. All control efforts are being directed toward the completion of the necessary rework in the 25 units in the present program. Ribes eradication in 1951 was continued in 12 of these units.

The Forest Service and the large operators are logging mature stands with a view toward limiting ribes regeneration. However, there are a number of small operators logging privately-owned tracts of mature timber within protected areas with no view toward limiting ribes regeneration. The ribes occurring as the result of such practices will represent a hazard to adjacent immature stands until they are removed.

A total of 12,521 acres was worked during the 1951 season. As a result of the 1951 ribes eradication and checking, 2,875 acres were placed on maintenance. There were 8,200 acres of maintenance prior to 1951 which reverted to a rework status due to logging and other natural disturbances.

There is a total of 156,175 acres of maintenance on the operation.

Surveys. A blister rust damage survey was conducted in the young mature western white pine stands in Bird, Gold, and Simmons Creek drainages during the summer of 1951 by a six-man crew. The work was financed and supervised by the Forest Service. The technical direction and the training of the crew were given by the Bureau. Five survey lines were run in the mature stands of Bird Creek, three in Gold Creek, and two in Simmons Creek. A detailed report of this important survey appears under the Developmental section of this publication.





W-224

Power sprayer and crew in operation on east fork of Potlatch Creek. Area logged in 1946.



W-229

Results of above power spray operation on 4-year-old *Ribes viscosissimum*. The sprayed ribes leaves have a white appearance in the photograph. Picture taken 3 weeks following application of 2,4,5-T.



No white pine stocking and disease surveys were conducted in the immature stands.

# RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

## CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 ST. JOE OPERATION

Item	Bureau of Entomology & Plant Quarantine					Forest Service BLR-4	Total
	BLR-1-4	Cooperative Control			Total		
		Federal BLR-3-4	State & Private	Total			
Salaries, perm.	\$20,360	\$ 2,160		\$ 2,160	\$22,520	\$ 17,537	\$ 40,057
Sal. & Wages, temp.		22,478	\$13,962	36,440	36,440	160,314	196,754
Contract ribes erad.						16,484	16,484
Subsistence supplies	1,133	3,559	2,199	5,758	6,891	50,304	57,195
Chemicals		2,760		2,760	2,760		2,760
Equipment	18	1,562		1,562	1,580	20,480	22,060
Travel & transp.	364	1,807		1,807	2,171	9,111	11,282
Other expenses	182	1,026	111	1,137	1,319	7,861	9,180
Total	\$22,057	\$35,352	\$16,272	\$51,624	\$73,681	\$282,091	\$355,772





TABLE 2

RISES ERADICATION BY AGENCIES  
ST. JOE OPERATION, 1951

Agency	State	Working	Acres	Man-Days	Ribes	Spray Gallons	Per Acre	
Bureau Cooperative	Idaho	First	1,160	1,250	552,700	58,970	1.08	476
		Second	680	1,230	53,200		1.81	78
		Other	550	380	12,600	4,290	.69	23
		Total	2,390	2,860	618,500	63,260	1.20	259
Forest Service	Idaho	First	150	650	127,700	10,000	4.33	851
		Second	3,060	3,010	36,000		.98	12
		Other	6,930	8,200	57,000	70	1.18	8
		Total	10,140	11,860	220,700	10,070	1.17	22
T O T A L S		First	1,310	1,900	680,400	68,970	1.45	519
		Second	3,740	4,240	89,200		1.13	24
		Other	7,480	8,580	69,600	4,360	1.15	9
		Total	12,530	14,720	839,200	73,330	1.17	67

TABLE 2a

CONTRACT AND CHEMICAL WORK  
ST. JOE OPERATION, 1951

Agency	Working	Contract Work Completed				Chemical Work		
		Number Contracts	Acres	Man-Days	Ribes	Amount Paid	Acres	Man-Days Gallons
Bureau Cooperative	First						199	203 58,970
	Other						10	22 4,290
	Total						209	225 63,260
Forest Service	First						50	69 10,000
	Second	3	275	364	5,256	\$ 7,249.00		
	Other	6	414	595	12,845	9,235.00	10	70
	Total	9	690	959	18,101	16,484.00	50	79 10,070
Total	First						249	272 68,970
	Second	3	275	364	5,256	7,249.00		
	Other	6	414	595	12,845	9,235.00	10	32 4,360
	Total	9	690	959	18,101	\$16,484.00	259	304 73,330

TABLE 3

RISES ERADICATION BY TYPES  
ST. JOE OPERATION, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Bureau Cooperative	Cutover 1940-49	1,160			1,160
	Reproduction 1910-39		680	170	850
	Foie			110	110
	Stream			270	270
	Total	1,160	680	550	2,390
Forest Service	Plantation 1940-49		100	970	1,070
	Cutover 1940-49	10			10
	Cutover 1920-39		260	200	460
	Reproduction 1910-39	90	1,820	4,960	6,870
	Foie		880	700	1,580
	Stream		50	100	150
Total	Total	150	3,060	6,930	10,140
	Plantation 1940-49		100	970	1,070
	Cutover 1940-49	1,170			1,170
	Cutover 1920-39		260	200	460
	Reproduction 1910-39	90	2,500	5,130	7,720
	Foie		880	810	1,690
Total	Stream		50	170	420
	Total	1,310	3,740	7,480	12,530



TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
ST. JOE OPERATION, 1951

State	working	Number of Acres Worked											
		By Forest Service				By Bureau of Entomology and Plant Quarantine				Total Federal	Total Other		
		National Forest	State	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total
Idaho	First	30	30	90	150		10	1,150	1,160	30	40	1,240	1,280
	Second	2,430	300	330	3,060	190	180	310	680	2,620	480	640	1,120
	Other	4,330	1,630	970	5,930	150	10	390	550	4,480	1,640	1,360	3,000
	Total	6,790	1,960	1,390	10,140	340	200	1,850	2,390	7,130	2,160	3,240	5,400

TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
ST. JOE OPERATION, 1929-1951

State	Class	Workings				Man-Lays	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Idaho	Ex-Coop.	21,000	29,000	23,000	73,000	62,000	6,427,000	146,000	.85	88
	Ex-Emerg.	190,000	42,000	3,000	235,000	158,000	43,593,000	77,000	.67	186
	FS-Reg.	89,000	95,000	63,000	247,000	273,000	36,486,000	344,000	1.11	148
	FS-Emerg.	71,000			71,000	45,000	15,333,000	101,000	.63	216
	CCC	172,000	18,000	2,000	192,000	225,000	56,890,000	248,000	1.17	296
	Total	543,000	184,000	91,000	818,000	763,000	158,729,000	916,000	.93	194

TABLE 6

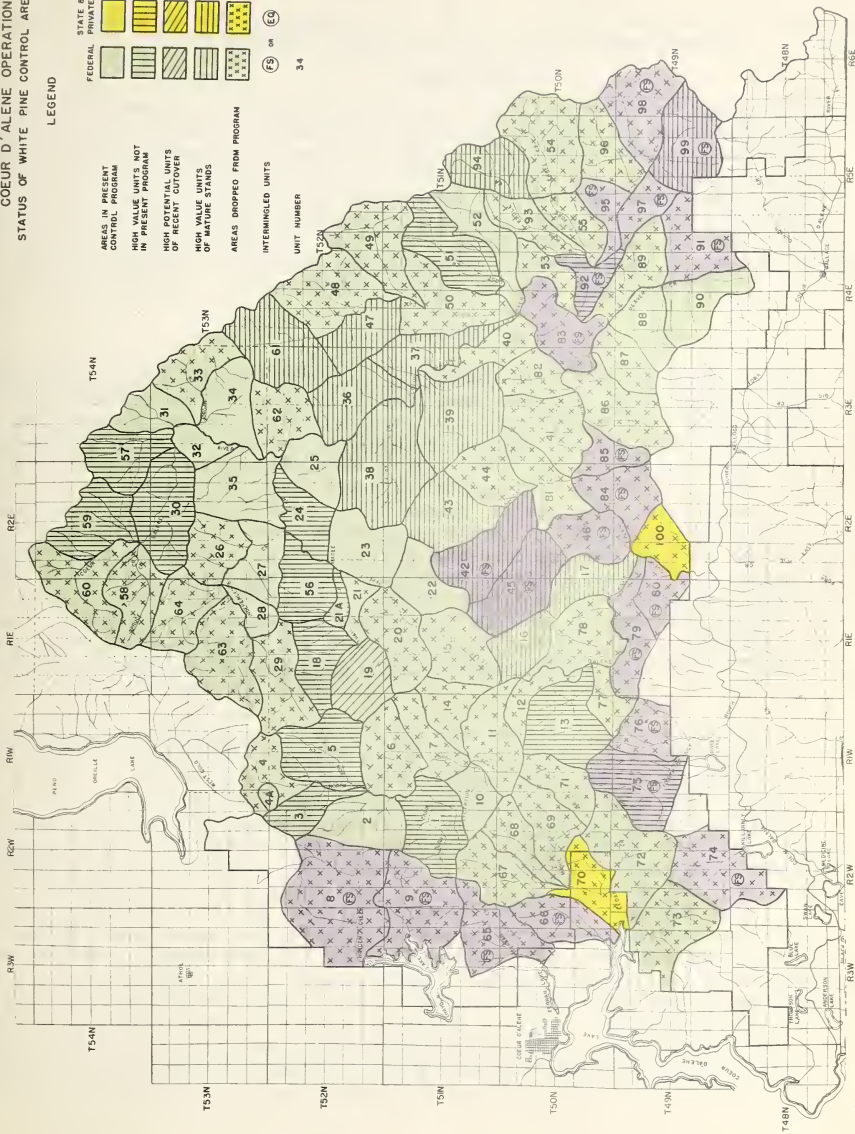
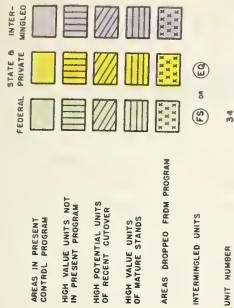
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
ST. JOE OPERATION, 1929-1951

State	Ownership	Net Acres in Control Area				
		Acres Worked			Acres Unworked	Total Acres
		First	Second	Other		
Idaho	National Forest	201,000	102,000	41,000	344,000	295,000
	Public Domain	11,000	5,000	3,000	19,000	25,000
	Subtotal Federal	212,000	107,000	44,000	363,000	320,000
	State	52,000	24,000	8,000	84,000	125,000
	Private	135,000	46,000	19,000	200,000	390,000
	Subtotal S&P	187,000	70,000	27,000	284,000	515,000
	Total	399,000	177,000	71,000	647,000	835,000



COEUR D'ALENE OPERATION  
STATUS OF WHITE PINE CONTROL ARE

### LEGEND







## BLISTER RUST CONTROL, COEUR D'ALENE OPERATION, 1951

By

F. J. Heinrich, Operation Supervisor, Bureau of Entomology and Plant Quarantine  
C. J. Pederson, Forest Officer, U. S. Forest Service

### INTRODUCTION

The Coeur d'Alene National Forest continued blister rust control operations according to priorities scheduled in the 5-year plan. Working units of highest potential value received the major allotment of man-days. Slight deviations from work plans were made in order to take advantage of existing work center camps. The primary objective of this year's work was the elimination of small concentrations of ribes which created a hazard to extensive white pine stands. The crew consisted of 170 men. Contract work was performed by 17 men involving 7 separate operators. Increased use of recent proven methods of chemical ribes eradication resulted in better work at lower costs on difficult areas.

### UNITS WORKED 1951

Hudlow Creek, Unit No. 2. This unit is predominantly white pine reproduction and pole along with cutover areas. Small remaining patches of mature timber are now being harvested. Within 2 years this area will be free from logging disturbances until the present pole stands are cut. In the cutover class, approximately 180 acres at the head of the middle fork of Hudlow Creek were considered too costly for rehabilitation and were deleted from the unit. The objective of this season's work was to remove the remaining ribes concentrations from within and adjacent to the pole stands in the Hudlow Creek drainage. The inexperienced crews available, using hand grubbing methods, did not reduce ribes populations to maintenance standards on portions of the area. Remaining work will be completed primarily by the chemical broadcast method. A heavy ribes concentration intermingled with dense brush at the head of Nicholas Creek, previously bypassed, was treated by broadcast spraying with 2,4,5-T. Satisfactory coverage was obtained using a truck-mounted spray unit. Final results will be determined in 1952.

Deception Creek, Unit No. 10. This 3,500-acre unit is the Deception Creek Experimental Forest area. Excellent reproduction, pole, and mature white pine are present. Conditions are favorable for ribes regeneration. During the past 3 years blow-down, snow damage, and salvage logging have caused canopy openings followed by the establishment of many Ribes lacustre and R. viscosissimum. This will necessitate a revision of cost estimates for future work. Because of potential blister rust damage to this valuable Experimental Forest it will receive No. 1 working priority. In 1951, work was performed on areas in Sands, Blue Rock, Miller, Hoodoo, Montford, and Ames Creek drainages. Designated areas supporting heavy ribes concentrations or dwarf ribes bushes were broadcast sprayed with 2,4,5-T applied with a truck-mounted power sprayer. The broadcast spraying method was used on 14 acres of heavy ribes concentrations in the Upper Sands Creek area and on 40 acres of dwarf ribes concentrations in the Ames Creek drainage. The Ames Creek work area was a 1937 experimental shelterwood cutting followed by clear-cutting in 1951. Future work plans include the completion of chemical work in the Ames and Montford Creek areas and hand ribes eradication in the Lower Sands Creek area.

Teepee Creek, Unit No. 22. Control work on this 6,000-acre unit of reproduction and pole white pine, as scheduled under the present 5-year program, is nearly completed. Only 4 acres of broadcast spray work remain in the Upper Riley Creek drainage. As a result of a 14-year lapse between initial and follow-up work, 16 percent of this stand has been damaged by blister rust. However, this area remains well stocked and is now in satisfactory condition. The 270 acres of mature white pine located at the head of Riley Creek are being harvested. Logging methods employed are designed to reduce the ribes potential which might otherwise be a hazard to adjacent pole stands.

Halsey Creek, Unit No. 23. No ribes eradication work has been performed in this unit since 1933-34 with the exception of a stream type spraying in 1950. Although 26 percent damage has occurred in the white pine pole stands, sufficient values remain to warrant blister rust protection. Work was performed on 370 acres during 1951 in the Elk Creek area. Work will be continued in 1952.

Alden Creek, Unit No. 31. The work area is a well-stocked plantation of 1922 origin. Isolated ribes concentrations are scattered throughout the stand and surrounding protection zone. Blister rust damage is less than 5 percent. Contract work was scheduled to eliminate costly camp installation and long, time-consuming walks to work areas. About half the area was completed by contract work in 1950 and 1951. A sufficient number of contractors was not available in 1951, resulting in work being performed on only 320 acres. Remaining work will be completed in 1952.

Clay Creek, Unit No. 43. A 1,000-acre block on cutover lands in the Steamboat Creek drainage was recently set up for the growing of white pine. Control work in this unit will be financed from KV funds. Work was started on this area in 1951. Ninety acres of excellent reproduction were treated.

Snowbird Creek, Unit No. 28. All scheduled upland work was completed this year. One hundred acres were worked by contractors and 40 acres of protection zone by regular crews. Upon completion of 90 acres of stream type by chemical methods in 1953 and 160 acres of upland in 1954, the white pine in this 1,700-acre unit will be protected from blister rust damage.

Owl Creek, Unit No. 27. This unit of white pine plantations was scheduled to be worked by contract. In 1951, only 210 of the 980 acres needing rework were completed. Due to the lack of capable contractors the area will be worked by regular crews in 1952.

#### CONTRACTING

The contracting of ribes eradication work fell far below preseason estimates. Plans had been made to contract 2,000 acres of scattered, remote areas in top priority units. Only 757 acres were worked to acceptable standards. Many experienced contractors entered the armed forces. No new contractors were developed among the young, inexperienced laborers recruited for force account work. At the peak of the season, 17 men were engaged in contracting. Nineteen contracts were active. Bid prices ranged from \$11 to \$23.75, averaging \$16. It does not appear that contracting can be expanded until an adequate number of responsible men is again available.





W-2516-5

Coeur d'Alene National Forest, Cathedral Jordan area; extensive 1924 white pine plantation on 1910 burn. Adequate protection from blister rust has permitted this fine stand to develop.



W-100

Coeur d'Alene National Forest, Cathedral-Jordan area. Close-up of above plantation. Trees are 6 to 10 inches in diameter and 20 to 30 feet in height.



WORKING UNITS IN THE PRESENT BLISTER RUST CONTROL PROGRAM

Working Unit			Man-Day Estimate for Protection Present Stands		1951 Work		Man-Days Previously Expended	Total Man-Days Expended	Man-Days Remaining 1950-54	M.B.F. Yield 1st 6 Periods	Man-Day Expenditure Per M.
No.	Name	Gross Acres	1950- 1954	1955- 1970	Acres	Man- Days					
10	Deception Creek	3,525	1,700	400	980	1,030	1,098	2,128	-428	25,640	.036
27	Owl Creek	5,267	1,731	396	210	260	654	914	817	83,650	.039
31	Alden Creek	4,267	629	337	320	160	87	247	382	36,332	.041
28	Snowbird Creek	1,789	955	352	140	195	503	698	257	35,986	.051
34	Lost Fork Jordan	7,233	1,929	552	-	-	-	-	1,929	77,585	.055
25	Brett Creek	5,573	1,173	564	60	45	521	566	607	98,982	.033
32	Cathedral	2,544	1,673	404	-	-	-	-	1,673	46,753	.055
4A	Honey Creek	280	57	106	60	150	-	150	-93	7,656	.023
52	E. Fk. Lost Cr.	7,097	6,174	679	-	-	-	-	6,174	62,763	.139
35	West Elk	8,371	1,949	390	720	1,060	-	1,060	889	21,189	.167
88	White Creek	4,089	1,546	572	50	30	352	382	1,164	18,692	.130
23	Halsey Creek	7,211	4,079	862	370	160	120	280	3,799	44,270	.135
2	Hudlow	6,350	4,199	630	840	1,160	1,204	2,364	1,835	53,674	.087
90	Dudley Creek	7,054	2,602	801	-	-	-	-	2,602	29,782	.122
22	Teepee Creek	6,455	2,845	690	1,010	1,180	1,817	2,997	-152	63,434	.048
43*	Clay Creek	1,000	-	-	90	10	-	10	-	-	-
Total		78,105	33,241	7,735	4,830	5,440	6,356	11,796	21,455	706,338	.077

\*Work to be financed from KV funds





## HELICOPTER AERIAL SPRAY WORK

In July 1950, aerial spray was applied by helicopter on 400 acres. This experimental spraying was performed to determine its potentialities in ribes eradication work. Inspection in 1951 showed the initial results to be generally satisfactory. On the Packsack area considerable variations in damage to ribes and other brush resulted. This was probably due to the height from which the spray was released. Because of snags, the plane operated 200 feet above ground level on portions of the area. Part of the 1950 spray areas was resprayed in 1951. It now appears that young ribes on open areas can be economically removed by the aerial spray method. In the Clay Creek Unit, 130 acres were treated, the primary purpose being to kill brush and ribes in preparation for control burning prior to planting with white pine.

## HELICOPTER AERIAL SPRAY

<u>Area</u>	<u>Date</u>	<u>Working</u>	<u>Acres</u>	<u>Man-Days</u>	<u>Gallons 2,4,5-T Solution</u>
Packsack	8/23-8/25/51	Respray	191	24	1,910
Independence Creek	8/24/51	Respray	43	4	680
Steamboat	8/26/51	Initial	130	8	1,410

## CHECKING AND SURVEYS

Satisfactory checking work was performed by nine inexperienced and two experienced checkers. Interpretation of data as determined from the 1950 checking studies was closely followed. All ribes eradication work was promptly checked upon completion. Two checking studies were made, one in Honey Creek plantation and one in the West Elk Creek drainage. Results of the 100-acre study will appear in a separate report.

## POST CHECK 1951

<u>Working Unit Number</u>	<u>Name</u>	<u>Drainage</u>	<u>Acres Checked</u>
2	Hudlow	West Fork Hudlow	300
2	Hudlow	Middle Fork Hudlow	70
4A	Honey Creek	Little N. F. Coeur d'Alene River	60
31	Alden	Alden Creek	300
23	Halsey	Little Elk Creek	1,060
22	Teepee	Short Creek	80
10	Deception	Deception Creek	90
33	Lost Fork Jordan	Calamity Creek	1,560
35	West Elk	West Elk Creek	90
43	Clay Creek	June Creek	140
			<u>3,750</u>

Stocking and pine damage surveys were continued on a small scale. Surveys were confined to units within the present program. The information obtained was necessary for further refinement of data in determining potential pine values in accordance to blister rust control costs. A total of 450 chains of survey strips was run, giving representative information on 950 acres.

#### CONTROL STATUS

At the close of the 1951 field season, 99,000 acres or 26 percent of the entire Coeur d'Alene National Forest control area have been classified as being on maintenance. The protected area comprises 15,000 acres of reproduction, 32,000 acres of pole, and 52,000 acres of mature type. Thirty-one percent of the 78,000 acres within the 16 selected units in the 1950-54 work program has been classified as maintenance. The net increase has been small during the past few years as area removed from maintenance, due to cutting, nearly offsets acreage gained in the protection of younger age class stands. Control work as planned in the 1950-54 work program is now behind schedule. With the greater use of chemical ribes eradication methods, the objectives as set up in the 5-year plan can be met.

#### RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date.

TABLE 1

#### CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 COEUR D'ALENE OPERATION

Item	Bureau of Entomology and Plant Quarantine BLR-1-4	Forest Service BLR-4	Total
Salaries, perm.	\$6,596	\$ 14,694	\$ 21,290
Sal. & Wages temp.		88,891	88,891
Contract ribes erad.		10,022	10,022
Subsistence supplies		25,698	25,698
Equipment		3,422	3,422
Travel and transp.	180	7,178	7,358
Other expenses	76	10,274	10,350
Total	\$6,852	\$160,179	\$167,031

TABLE 2

RIBES ERADICATION BY AGENCIES  
COEUR D'ALENE OPERATION, 1951

Agency	State	Working	Acres	Man-Days	Ribes	Spray Gallons	Per Acre	
							Man-Days	Ribes
Forest Service	Idaho	First	280	180	5,000	4,300	.64	18
		Second	1,830	1,870	44,100	6,190	1.02	24
		Other	2,720	3,390	57,300	10,040	1.25	21
		Total	4,830	5,440	106,400	20,530	1.13	22

TABLE 2a

CONTRACT AND CHEMICAL WORK  
COEUR D'ALENE OPERATION, 1951

Agency	Working	Contract Work Completed					Chemical Work		
		Number Contracts	Acres	Man-Days	Ribes	Amount Paid	Acres	Man-Days	Gallons
Forest Service	First	3	62	46	1,312	\$ 1,086.00	30	40	4,300
	Second	13	468	402	13,159	7,180.00	135	197	6,194
	Other	3	227	188	6,489	3,332.00	110	300	10,035
	Total	19	757	636	20,960	\$11,598.00	275	537	20,529

TABLE 3

RIBES ERADICATION BY TYPES  
COEUR D'ALENE OPERATION, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Forest Service	Plantation 1940-49		40	60	100
	Cutover 1940-49	110		80	190
	Cutover 1920-39		120	130	250
	Reproduction 1910-39	60	370	1,040	1,470
	Pole	20	1,110	1,310	2,440
	Mature	90	190	40	320
	Stream			60	60
	Total	280	1,830	2,720	4,830



TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
COEUR D'ALENE OPERATION, 1951

State	Working	Acres Worked By Forest Service		
		National Forest	Private	Total
Idaho	First	280		280
	Second	1,770	60	1,830
	Other	2,720		2,720
	Total	4,770	60	4,830

TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
COEUR D'ALENE OPERATION, 1927-1951

State	Class	Workings				Man- Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man- Days	Ribes
Idaho	Ex-Reg.	26,000			26,000	8,000	2,846,000		.30	109
	Ex-Emerg.	41,000			41,000	36,000	6,589,000		.88	161
	FS-Reg.	53,000	38,000	21,000	112,000	133,000	15,859,000	53,000	1.19	142
	FS-Emerg.	102,000	10,000		112,000	87,000	17,620,000		.78	157
	CCC	126,000	18,000	4,000	148,000	220,000	26,145,000		1.49	177
	Total	348,000	66,000	25,000	439,000	484,000	69,059,000	53,000	1.10	157

TABLE 6

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
COEUR D'ALENE OPERATION, 1927-1951

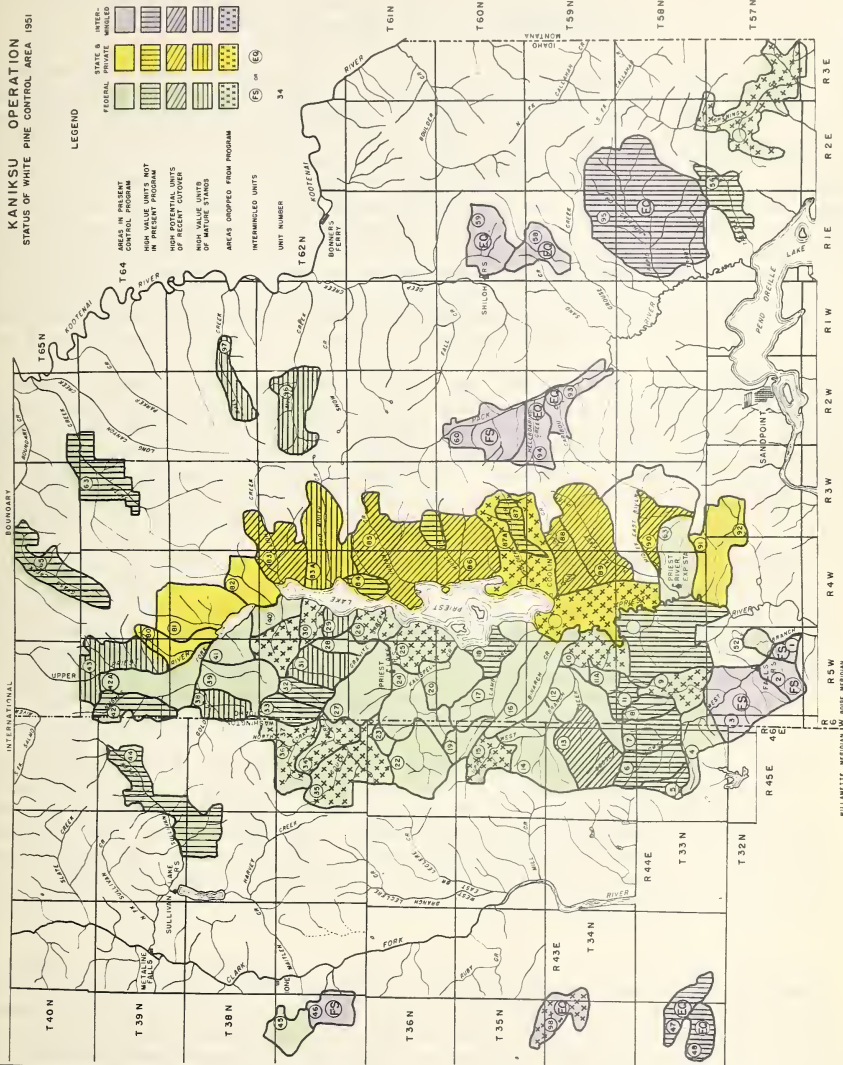
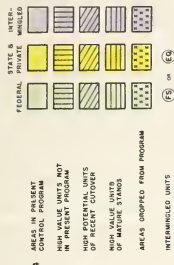
State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	310,000	63,000	24,000	397,000	51,000	361,000
	State	5,000			5,000	1,000	6,000
	Private	11,000	2,000		13,000	6,000	17,000
	Subtotal S&P	16,000	2,000		18,000	7,000	23,000
	Total	326,000	65,000	24,000	415,000	58,000	384,000





# KANIKSU OPERATION STATUS OF WHITE PINE CONTROL AREA 1951

## LEGEND





## BLISTER RUST CONTROL, KANIKSU OPERATION, 1951

By

H. A. Brischle, Operation Supervisor  
H. J. Viche, Forester, U. S. Forest Service

Increased allotments permitted both the Forest Service and the Bureau of Entomology and Plant Quarantine to have slightly larger blister rust control programs in 1951 than the previous year. This increase was reflected in 13 percent more effective man-days than in 1950. Forest Service activities were under the supervision of Mr. Henry Viche, succeeding Mr. Ray Hilding as staff-man at the start of the field season. The Forest Service phase of the operation consisted of nine 25-man camps, employing 236 men at the peak of the season and a 5-man crew using power spray equipment. In addition to the regular crews, 16 areas were awarded to seven contractors on a competitive bid basis. A helicopter was employed to treat two areas of heavy ribes in brush along ridge tops. The Bureau program consisted of a 35-man camp and four contract areas located on state and private lands. The Bureau camp operated a portable power spray unit that was transported into the work area with pack stock.

The labor situation was favorable, but not as good as 1950. Many experienced workers and checkers had been called into the armed services. Some 17-year-old workers were hired by the Forest Service, and there was more turn-over in the forest camps than during the past season. Forest Service crews were called out on a number of fires, none longer than 3 days' duration. Approximately 1,100 effective man-days were lost to blister rust work due to fires, which was equivalent to a 25-man camp for the season.

During the period 1947-49, the white pine areas on the Kaniksu were divided into working units. Surveys to determine stocking, stand composition, site, damage by rust, and working conditions were made. From these data each unit was evaluated and arranged in order of cost per thousand board feet of white pine for blister rust control. It was found that if present level funds were available for a 7-year period, the work on the Forest Service and Bureau units would approach maintenance standards, as shown in the table entitled "Forest Service Units in the Present 1950-56 Blister Rust Program."

The dragline method on a lot basis was universally used in all camps. This system is now well established and thus far is the best method known for securing maximum production and efficient work. There were no significant changes in the use of draglines. Supervisory personnel were on the alert to keep workers laying maximum width lanes consistent with good efficiency. The use of chemical methods was closely integrated with hand work and used on all areas where its application would be more effective and economical than hand pulling.

The spray work was on selected areas of cutover, burn, stream type, and brush areas along ridge tops. Various types of equipment were used. A helicopter treated 2 areas of 60 and 110 acres where ribes occurred in dense brush along the ridges. Truck-mounted orchard-type machines with 400-gallon capacity tanks were used on areas accessible by roads. A hand portable power unit with a 50-gallon drum for a tank was packed by stock into an area where 50 acres of large Ribes lacustre were treated. All camps had knapsack sprayers which were used

wherever practical. Hi-Fog guns were used effectively on several areas where water for other types of sprayers was insufficient. The truck-mounted units continue to handle the bulk of the work. However, real savings are effected using the knapsack units on small areas, sometimes less than a  $1\frac{1}{2}$ -acre lot. Chemical ribes eradication work is summarized as follows:

Type of Equipment	Acres Treated	Man-Days	Gals. of Solution	Ribes Treated	Per Acre		
					M.D.	Gallons	Ribes
Truck-mounted units	154	212	36,603	46,730	1.34	238	303
Helicopter	170	25	2,240	10,200		13	125
Hand portable power	50	106	3,593	35,930	2.12	72	719
Knapsack	255	490	6,774	56,641	1.92	27	222
Hi-Fog	31	94	325	10,448	3.03	10	337
Total	720	938	49,535	159,149			

The helicopter areas are as follows:

#### Gleason Mountain

This area is located along the ridge between Gleason Mountain Lookout and Hungry Mountain. It represented difficult working conditions for ground crews, and due to its inaccessibility by road, other methods of chemical work were not feasible. The objective was to reduce the ribes along the ridge, and increase the protection zone adjacent to the Kalispell Creek plantation. The work was done late in August and the effectiveness of the chemical cannot be determined until next season when a systematic check will be made.

#### Diamond Peak

The Diamond Peak area is located along the ridge about one-half mile east of the lookout and extends down the slope on Diamond Creek from 5 to 15 chains to the edge of the plantation. The area was in a 1926 burn that had come back to heavy brush and ribes. It was a threat to the Diamond Creek plantation. The objective was to reduce the ribes and increase the protection zone adjacent to the plantation. The area was flown at snag-height level. The effectiveness of the work will not be known until next season when a systematic check will be made.

Spray on both areas was applied at the rate of 13.3 gallons or 1.33 pounds of acid 2,4,5-T per acre. A tabulation for the work follows:

	<u>Gleason Mountain</u>	<u>Diamond Peak</u>
Acres	110	60
Total man-hours (labor)	118	78
Gallons concentrated 2,4,5-T	35	20
Gallons of spray	1,400	840
Gallons of emulsion oil	7.5	6
Helicopter flying time	5 hrs.-50 min.	2 hrs.
Costs:		
Labor	\$185.60	\$123.65
Chemical	418.25	239.00



	Gleason Mountain	Diamond Peak
Emulsion oil	\$ 9.52	\$ 5.10
Flying time	520.66	190.00
Transportation	30.00	25.00
Miscellaneous supplies	25.00	15.00
Total cost per project	\$1,189.03	\$597.75
Cost per acre	10.81	9.96

With the close of the 1951 season, the Kaniksu operation has been doing ribes eradication work by contract for five seasons. During this period, 61 contracts have been completed by the Forest Service and 11 by the Bureau on state and private lands. The use of contract workers has been a valuable aid in getting rework done where the areas are small and widely separated. Such areas would be costly to work with regular camp crews due to transportation of workers and the supervision required for widely separated crews.

The following tabulation shows the extent of contract work since 1947.

Year	Agency	No. Contract Areas Finished	Acres	Net Paid Contractors	Net per Acre Paid Contractors
1947	F.S.	2	204	\$ 846.39	\$4.15
1948	F.S.	8	841	9,723.46	11.56
1949	F.S.	17	1,299	16,158.14	12.44
1949	E.Q.	4	426	4,342.76	10.19
1950	F.S.	18	1,687	22,504.35	13.34
1950	E.Q.	5	628	8,045.26	12.81
1951	F.S.	16	1,283	17,723.01	13.81
1951	E.Q.	2	168	2,508.92	14.93
1947-51	F.S.	61	5,314	66,955.35	12.60
1947-51	E.Q.	11	1,222	14,896.94	12.19

The contract program for 1951 was somewhat smaller than for 1950. Several of the best contract workers were called to military service. Others failed to return because they wanted work with a longer season. In spite of the efforts by the permanent personnel to promote and interest camp workers in this type of work, few new contractors were secured. The personnel will continue to try to interest individuals in this work next year. Six Forest Service and two Bureau contract areas were unfinished and time extensions for completion in 1952 have been granted.

Due to the increase in program and the loss of experienced checkers to the armed services, the season was started with a less-than-normal size checking crew. In order to carry the work load, it was necessary to select some of the better qualified men with at least a year of eradication experience and give them checking training. At the peak of the season the checking organization consisted of 15 Forest Service and Bureau checkers under the supervision of Q. W. Larson, the checker foreman. This crew was able to promptly check all work completed. When not occupied with current season work, a post check was

made of areas to be worked next year. A total of 8,580 acres was post checked, 2,100 acres or 24 percent were found to meet maintenance standards and are eliminated from further crew work.

No qualified personnel were available for disease survey. This survey on the forest lands is about 90 percent complete. It is planned to have a two-man crew continue with this work next year.

During the past season the Forest Service crews and contractors worked 10,290 acres. The Bureau crews and contractors worked 1,890 acres on state and private lands. As a result of the combined work of both agencies, 6,500 acres or 53 percent of this area worked were placed on maintenance. Under the present 1950-56 program involving 24 Forest Service and 8 Bureau units, 115,900 acres or 59 percent of the total area are now on maintenance. With the present level of funds continuing through 1956, the 24 selected Forest Service units can be largely on maintenance. For the Bureau, with present funds continuing, it will take approximately 8 years to complete the work on the eight selected units.

Location and description of areas (see map for location of units)

Forest Service Program

<u>Unit Number</u>	<u>Name</u>	<u>Type of Work</u>
12	Pelke	Regular crew labor
22	Kalispell	" " "
23	Diamond Peak	" " "
27	Reeder Mountain	" " "
39	Boulder Creek	" " "
42A	Hughes Ridge	" " "
53	Experiment Station	Power spray work
17	Lower Lamb Creek	" " "
23	Diamond Peak	" " "
39	Boulder Creek	" " "
22	Kalispell Creek	Helicopter spray work
23	Diamond Peak	" " "
1	Cuban Hill	Contractors
2	Fine Creek	"
52	PeeWee Creek	"
19	Upper Lamb Creek	"
22	Kalispell Creek	"

Bureau Program

59	Trail Creek	Regular crew labor
91	Fox Creek	Contractors
92	Big Creek	"



FOREST SERVICE UNITS IN THE PRESENT 1950-56 BLISTER RUST PROGRAM

Unit	Name	Gross Acres	Percent of Area Now on Maintenance	Total Man-Days Req. 1950-56 Program	Man-Days Used 1950-51 (2 Seasons)	Man-Days Remaining for 1952-56 (5 Seasons)	120-Year WP Yield Due BRC M.B.F.	Total Cost of BRC Per M First Crop White Pine
53	Experiment Station	6,280	65	3,030	270	2,760	19,192	\$2.56
22	Kalispell Creek	9,390	70	3,641	1,868	1,773	228,297	1.34
46	Tiger Hill	3,380	85	1,870	-	1,870	67,091	1.58
27	Reeder Mountain	9,500	65	2,879	3,430	-551	189,880	1.03
41	Navigation	4,140	35	2,850	-	2,850	59,736	1.26
28	Fedar Creek	2,400	95	271	-	271	22,955	3.10
19	Upper Lamb Creek	3,140	20	1,113	238	875	34,896	1.44
20	Kalispell Bay	6,940	60	1,857	-	1,857	124,524	.74
16	Binarch Creek	8,350	50	3,504	-	3,504	104,495	1.29
39	Boulder Creek	3,940	68	2,535	2,330	205	65,026	1.44
11A	Dubius Creek	1,370	30	937	-	937	18,439	1.90
60	Pack River	9,860	80	3,158	-	3,158	89,385	-
1	Cuban Hill	1,450	85	465	270	195	10,962	2.33
4	Bear Paw	5,810	50	4,179	-	4,179	74,101	2.23
45	Big Muddy	7,710	45	4,379	-	4,379	54,169	2.82
12	Pelke	9,640	60	5,173	2,750	2,423	124,042	1.53
14	Solo Creek	11,190	45	1,578	-	1,578	83,179	.83
40	Lower Beaver	2,590	65	872	-	872	34,810	-
23	Diamond Peak	870	35	1,059	1,070	-11	16,105	2.27
17	Lower Lamb Creek	11,530	50	6,025	50	5,975	122,585	1.21
42A	Hughes Ridge	9,050	35	5,664	510	5,154	92,727	1.35
3	Tunnel Creek	13,260	65	7,261	1,592	5,669	141,691	2.05
58	N.F. Grouse	6,050	-	3,302	-	3,302	39,330	3.62
52	PeeWee Creek	5,530	35	2,507	90	2,417	31,907	3.02
	Total	153,340		70,109	14,468	56,203	1,849,524	
BUREAU UNITS								
80	Ruby Creek	5,560	80	801	-	801	81,000	\$1.00
81	Trapper Creek	9,220	85	3,110	-	3,110	177,594	1.13
82	Caribou Creek	4,980	40	1,285	170	1,115	54,212	1.33
91	Fox Creek	3,360	90	314	310	4	31,559	2.59
92	Big Creek	8,000	45	3,137	60	3,077	42,274	4.82
59	Trail Creek	7,580	65	4,264	2,550	1,714	74,169	2.08
93	Samuels	4,520	60	2,577	-	2,577	29,394	4.94
94	Hellroaring	5,150	80	1,602	-	1,602	55,869	2.23
	Total	48,370		17,090	3,090	14,000	546,071	



## Forest Service Camps on Federal Lands

### Pelke Unit No. 12

One camp employing 27 men at the peak of the season was located in permanent work quarters near the Pelke Administrative Site. It completed 1,530 acres of rework in 1920-39 cutover and 60- to 80-year-old stands. An area of 120 acres in cutover, where ribes occurred along skid trails, was treated with back-pack spray equipment using 2,4,5-T. As a result of this year's work, 960 acres were placed on maintenance. The estimated blister rust work load on this unit for the period 1947-1956 is 5,173 man-days.

During 1950-51, 2,750 man-days were expended. Sixty percent of the gross area is now on maintenance. The white pine producing potential of this unit is 124 million board feet, through the next six 20-year periods. It is estimated the cost of blister rust work will be \$2.15 per thousand board feet. It is planned to continue work on this unit with a 25-man camp in 1952.

### Kalispell Unit No. 22

Two camps, employing 49 men at the peak of the season, were located in the Kalispell Creek unit. They completed a total of 2,500 acres of rework in plantation and reproduction areas. As a result of this year's work, 1,470 acres were placed on maintenance and 1,050 will require a post check.

It was estimated the control job would require 5,300 man-days for the period 1947-1956. During the past 2 years, 2,700 man-days have been expended. Seventy percent of the gross area is on maintenance. This unit has a gross of 9,400 acres of which 5,200 are planted to white pine. The planted white pine area has a potential yield of 228 million feet of white pine sawtimber through the first crop rotation if protected from the rust. It is estimated the cost of blister rust control will be \$1.69 per thousand board feet. It is planned to continue work on this unit in 1952 with one 25-man camp.

### Diamond Peak Unit No. 23

In addition to the helicopter spray job, one camp of 24 men was located in this unit. They completed 640 acres of rework in the plantation and reproduction adjacent to the plantation. As a result of this year's work, 320 acres of 1920-39 reproduction were put on maintenance. Numerous small suppressed R. lacustre and R. viscosissimum continue to show up after favorable growing seasons. Several areas of these small ribes were treated with back-pack spray units using 2,4,5-T. It is planned to use a power unit next year on another troublesome area of approximately 20 acres.

It is estimated the control work on this unit will require 1,600 man-days in the period 1947-66. This is one of the smallest units in the program. It comprises 870 acres. At maturity it is estimated it will produce over 16 million feet of sawtimber with a cost of blister rust control amounting to \$2.61 per thousand board feet.

#### Reeder Mountain Unit No. 27

Three pack camps employing 70 men at the peak of the season completed 2,210 acres of rework in 60- to 80-year-old pole stands. As a result of this work 1,640 acres were placed on maintenance. A total of 6,175 acres or 65 percent of the area is now on maintenance.

The Reeder Mountain unit comprises 9,500 acres of 60- to 80-year-old white pine pole stands having a potential of 190 million board feet of white pine sawtimber. The cost of blister rust control will be approximately \$1.10 per thousand board feet. In 1952 it is planned to continue work in the pack camp location on Athol Creek. A haul-out crew from Blister Rust Control Headquarters is scheduled to work an area in the vicinity of the Priest Lake Ranger Station.

#### Boulder Creek Unit No. 39

One camp of 20 men completed an area of 720 acres of rework. As a result of this season's work, 530 acres were put on maintenance. Due to time lost by crews on fires the work on this unit was not completed this year as planned. A five-man crew, operating a truck-mounted spray unit, treated 60 acres of large R. lacustre in heavy brush and debris.

Boulder Creek is one of the best units of natural reproduction and pole white pine on the forest. It is estimated the yield will be 65 million feet of white pine sawtimber at maturity. The cost of blister rust control work is estimated to be \$1.90 per thousand board feet.

#### Hughes Ridge Unit No. 42A

A crew of 25 men was located in the permanent buildings at Hughes Meadows. Until this year no work had been done on the unit since 1936. A recent disease survey shows the rust losses to be only 12 percent. This loss is not detrimental to the stocking. The past season's crew work resulted in 1,020 additional acres being placed on maintenance. The unit contains 9,050 acres. To date 35 percent of the area is on maintenance. At maturity the present stands will produce 92 million feet of white pine sawtimber with an estimated cost for blister rust control amounting to \$1.97 per thousand board feet.

Present plans call for operating two 25-man camps on this unit in 1952.

#### Cooperative Camps on State and Private Lands

##### Trail Creek Unit No. 59

For the second year the Bureau has operated a camp in the Trail Creek drainage near Naples, Idaho. The camp was located a distance of  $4\frac{1}{2}$  miles from the road, and equipment and supplies were taken in with pack stock. The first crews arrived June 4, and the camp operated until September 12. At the peak of the season there were 40 men in camp. All areas covered represented initial work; 560 acres were put on maintenance as a result of this season's work. A total of 4,930 acres or 65 percent of the unit is on maintenance.

A problem area of 50 acres of large *R. lacustre* in brush and debris was treated with 2,4,5-T spray. The results look very promising but the full effect of the chemical cannot be checked until next year.

The ownership in this unit is intermingled; the largest private owner is the Pack River Lumber Company. The ownership is in the following ratio: Federal 47 percent, private 43 percent, state 10 percent.

It is estimated the cost for blister rust control will amount to \$2.08 per thousand board feet.

## RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date.

TABLE 1

### CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 KANIKSU OPERATION

Item	Bureau of Entomology & Plant Quarantine					Forest Service BLR-4	Total
	BLR-1-4	Cooperative Control			Total		
		BLR-3-4	Federal State & Private	Total			
Salaries perm.	\$13,688				\$13,688	\$ 30,167	\$ 43,855
Sal. & Wages temp.		\$16,406	\$4,110	\$20,516	20,516	126,438	146,954
Contract ribes erad.		711	1,197	1,908	1,908	17,358	19,266
Subsistence supplies		3,187		3,187	3,187	36,926	40,113
Equipment		1,757		1,757	1,757	9,656	11,413
Travel and transp.	342	960		960	1,302	6,471	7,773
Other expenses	26	321		321	347	11,241	11,588
Total	\$14,056	\$23,342	\$5,307	\$28,649	\$42,705	\$238,257	\$280,962





TABLE 2

RIBES ERADICATION BY AGENCIES  
KANIKSU OPERATION, 1951

Agency	State	Working	Acres	Man-Days	Ribes	Spray	Per Acre	
						Gallons	Man-Days	Ribees
Bureau Cooperative	Idaho	First	1,720	1,590	149,000	3,600	.92	87
		Other	170	110	3,000		.65	18
		Total	1,890	1,700	152,000	3,600	.90	80
	Idaho	Second	5,920	4,860	149,000	21,770	.82	25
		Other	330	200	14,000	7,580	.61	42
		Total	6,250	5,060	163,000	29,350	.81	26
Forest Service	Washington	Second	390	210	46,000	13,540	.54	118
		Other	3,650	2,810	70,000	3,880	.77	19
		Total	4,040	3,020	116,000	17,420	.75	29
	Total	Second	6,310	5,070	195,000	35,310	.80	31
		Other	3,980	3,010	84,000	11,460	.76	28
		Total	10,290	8,080	279,000	46,770	.79	27
T O T A L S		First	1,720	1,590	149,000	3,600	.92	87
		Second	6,310	5,070	195,000	35,310	.80	31
		Other	4,150	3,120	87,000	11,460	.75	21
		Total	12,180	9,780	431,000	50,370	.80	35

TABLE 2a

CONTRACT AND CHEMICAL WORK  
KANIKSU OPERATION, 1951

Agency	Working	Contract Work Completed				Chemical Work		
		Number Contracts	Acres	Man-Days	Ribes	Amount Paid	Acres	Man-Days
Bureau Cooperative	First						50	100
	Other	2	170	110	3,000	\$ 2,509.00	100	3,600
	Total	2	170	110	3,000	2,509.00	50	100
Forest Service	Second	7	580	500	31,000	8,967.00	520	730
	Other	9	700	450	14,000	8,756.00	150	130
	Total	16	1,280	950	45,000	17,723.00	670	860
Total	First						50	100
	Second	7	580	500	31,000	8,967.00	520	730
	Other	11	870	560	17,000	11,255.00	150	130
	Total	18	1,450	1,060	48,000	\$20,232.00	720	960

TABLE 3

RIBES ERADICATION BY TYPES  
KANIKSU OPERATION, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Bureau Cooperative	Cutover 1920-39			170	170
	Fole	1,720			1,720
	Total	1,720		170	1,890
Forest Service	Plantation 1940-49		70	3,420	3,490
	Cutover 1940-49		250	80	330
	Cutover 1920-39		570	180	750
	Reproduction 1910-39		260	160	420
	Fole		4,980		4,980
	Stream		180	140	320
	Total		6,310	3,980	10,290
Total	Plantation 1940-49		70	3,420	3,490
	Cutover 1940-49		250	80	330
	Cutover 1920-39		570	350	920
	Reproduction 1910-39		260	160	420
	Fole	1,720	4,980		6,700
	Stream		180	140	320
	Total	1,720	6,310	4,150	12,180



TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
KANIKSU OPERATION, 1951

State	Working	Number of Acres Worked											
		By Forest Service			By Bureau of Entomology and Plant Quarantine				Total Federal	Total Other			GRAND TOTAL
		National Forest	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total	
Idaho	First				770	40	910	1,720	770	40	910	950	1,720
	Second	5,790	130	5,920					5,790		130	130	5,920
	Other	330		330		170		170	330	170		170	500
	Total	6,120	130	6,250	770	210	910	1,890	6,890	210	1,040	1,250	8,140
Washington	Second	350	40	390					350		40	40	390
	Other	3,650		3,650					3,650				3,650
	Total	4,000	40	4,040					4,000		40	40	4,040
	First				770	40	910	1,720	770	40	910	950	1,720
Total	Second	6,140	170	6,310					6,140		170	170	6,310
	Other	3,980		3,980		170		170	3,980	170		170	4,150
	Total	10,120	170	10,290	770	210	910	1,890	10,890	210	1,080	1,290	12,180

TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
KANIKSU OPERATION, 1923-1951

State	Class	Workings				Man-Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Idaho	Ev-Coop.	140,000	32,000	15,000	187,000	77,000	13,288,000	6,000	.41	71
	Ev-Emerg.	81,000	14,000	4,000	99,000	69,000	11,334,000		.70	114
	FS-Reg.	20,000	42,000	9,000	71,000	53,000	5,752,000	48,000	.89	81
	FS-Emerg.	88,000	11,000		99,000	39,000	8,788,000		.39	89
	CCC	55,000	8,000		63,000	50,000	8,452,000		.79	134
	Total	384,000	107,000	28,000	519,000	298,000	47,614,000	54,000	.57	92
Washington	Ev-Emerg.	30,000	2,000		32,000	19,000	6,754,000		.59	211
	FS-Reg.	26,000	29,000	16,000	71,000	58,000	11,734,000	60,000	.82	165
	FS-Emerg.	35,000	2,000		37,000	14,000	4,014,000		.38	108
	CCC	20,000	2,000		22,000	25,000	3,487,000		1.14	159
	Total	111,000	35,000	16,000	162,000	116,000	25,989,000	60,000	.72	160
	Ev-Coop.	140,000	32,000	15,000	187,000	77,000	13,288,000	6,000	.41	71
Totals	Ev-Emerg.	111,000	16,000	4,000	131,000	86,000	16,088,000		.67	138
	FS-Reg.	46,000	71,000	25,000	142,000	121,000	17,486,000	108,000	.85	123
	FS-Emerg.	123,000	13,000		136,000	53,000	12,802,000		.39	94
	CCC	75,000	10,000		85,000	75,000	11,939,000		.88	140
	Total	495,000	142,000	44,000	681,000	414,000	73,503,000	114,000	.61	108

TABLE 6

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
KANIKSU OPERATION 1923-1951

State	Ownership	Net Acres in Control Area					
		Acres Worked			Total	Acres Unworked	
		First	Second	Other		Total	Unworked
Idaho	National Forest	182,000	51,000	9,000	252,000	54,000	236,000
	State	104,000	28,000	15,000	147,000	31,000	135,000
	Private	68,000	18,000	4,000	90,000	42,000	110,000
	Subtotal S&P	172,000	46,000	19,000	237,000	73,000	245,000
	Total	354,000	107,000	28,000	489,000	127,000	481,000
Washington	National Forest	90,000	32,000	16,000	138,000	30,000	120,000
	State	2,000			2,000		2,000
	Private	5,000	2,000	1,000	8,000	4,000	9,000
	Subtotal S&P	7,000	2,000	1,000	10,000	4,000	11,000
	Total	97,000	34,000	17,000	148,000	34,000	131,000
Total	National Forest	272,000	93,000	25,000	390,000	84,000	356,000
	State	106,000	28,000	15,000	149,000	31,000	137,000
	Private	73,000	20,000	5,000	98,000	46,000	119,000
	Subtotal S&P	179,000	48,000	20,000	247,000	77,000	256,000
	Total	451,000	141,000	45,000	637,000	161,000	612,000









# BLISTER RUST CONTROL, CABINET NATIONAL FOREST, 1951

By

A. S. Skoglund, Operation Supervisor

Neil Fullerton, Forester, U.S. Forest Service

Ribes eradication in the Cabinet National Forest was performed on plantations and reproduction stands in Big Creek and Pilgrim Creek.

During 1951 production and efficiency of the crews dropped below that attained during 1949 and 1950. A poor quality of labor and lack of experienced overhead were contributing factors to this condition. Lowering of recruitment qualifications in order to reach a peak of 100 men had a detrimental effect on the work. The \$500 limitation for dependency exemptions in federal income tax returns was also responsible for considerable turn-over among the younger class of employees. A number of employees under 18 years of age quit just short of earning \$500 in order to qualify as dependents.

The crews are continuing to maintain an enviable record of no lost-time accidents over a 3-year period.

## West Fork Big Creek Unit

A 90-man camp was established on the West Fork of Big Creek on June 1 to perform initial and rework in the 27-year-old white pine plantations. This unit was logged in 1918, burned in 1919, and planted predominately to white pine in 1924. As a result of fires, ribes had become established over all of the cutover area. Masses of Ribes lacustre were found in the basins in the upper limits of the drainage.

Nearly 45 percent of the original stocking has been damaged by blister rust, but the stands are still medium stocked with new white pine seedlings continuing to appear. Because of this heavy damage the protective zone was extended 20 chains further up the drainage to include all the cutover area. The working conditions were extremely difficult in these extended areas with over 1,250 ribes per acre being destroyed. Even the working conditions in the rework areas were difficult due to heavy brush though only 40 ribes per acre were removed.

The chemical spray method of ribes eradication was used extensively this past season. Comparison of the extent of hand and chemical methods are summarized as follows:

Method	Acres Worked	Man-Days	Ribes	M-D/Acre	Ribes/Acre
Hand	1,030 (72%)	2,730 (78%)	47 M ( 9%)	2.65	46
Chemical	400 (28%)	780 (22%)	501 M (91%)	1.95	1,253

Only lack of additional spray equipment prevented further use being made of chemical methods.

The large masses of ribes in the right hand branch of West Fork Big Creek were treated with 2,4,5-T sprays supplied by power units. A portable power spray unit with necessary supplies was back-packed in for a mile for early season

use. Later in the season a road was built into the area and the portable unit replaced with a mobile one to increase the efficiency of the operation. The large unit of 400-gallon capacity could supply solution for four nozzlemen for periods up to 3 hours without refilling.

The area on the north slope of the left hand branch was worked by a combination of methods. The stream type and a 20-chain belt of upland were treated with a power sprayer. Hi-Fog guns were used to treat a 10-chain strip of area above the power spray portion. The upper 10-chain strip to the ridge was laid out for dragline work, but was only partially completed. This combination of methods applied to even smaller units of area will eventually set a pattern for control work in the Cabinet Forest.

The stream type in the main fork was sprayed with the large mobile unit at a rate of less than one man-day per acre.

A total of 945 acres is now on maintenance in this unit of 3,275 acres. A 50-man crew will be required to complete work in the unit in 1952. A 2,4,5-T chemical spray should be used whenever practical.

#### Pilgrim Creek Unit

In 1951, 70 acres were worked by contractors. This brings the total area worked to date by contractors to 230 acres. This season the quality of contract work was much improved, requiring only a small amount of rework in stream type in contrast to the large amount required in 1950.

An additional area of 178 acres has been laid out for contract work in 1952. Several of the overhead in camp have examined the areas in order to submit a bid. These prospective bidders should provide some competition which has been lacking thus far. No saving has been made to date in the over-all cost per acre mainly because of the lack of competitive bidding. However, it has not been necessary to establish any camp or provide additional supervision.

#### South Fork Marten Creek Unit

An inspection of 1950 spraying operations in the upper South Fork of Marten Creek revealed some interesting results. The effectiveness of chemical treatment largely depends on the ability and assiduity of the individual crewman. Very effective kill was observed in several areas whereas in another the results were not as satisfactory. A large reduction in brush cover but an increase in grasses in the year following spraying operations is characteristic of 2,4,5-T spray areas. Seedlings are likely to occur in the heavy brush areas. A respray in 1950 on 1949 original spray area of 15 acres accomplished practically a complete kill of all ribes bushes. From observations thus far, it appears that a practical method of treatment will be a rapid broadcast spray on first work followed 2 years later with a selective spray of resprouts and a broadcast spray of probable seedling areas.

A crew of four spray men and a foreman can effectively treat the slopes in the upper basins of both Marten and Trout Creeks with the large mobile spray unit at a cost less than that required for hand pulling. Without additional power spray equipment, several seasons will be needed to complete the spray work in these drainages.

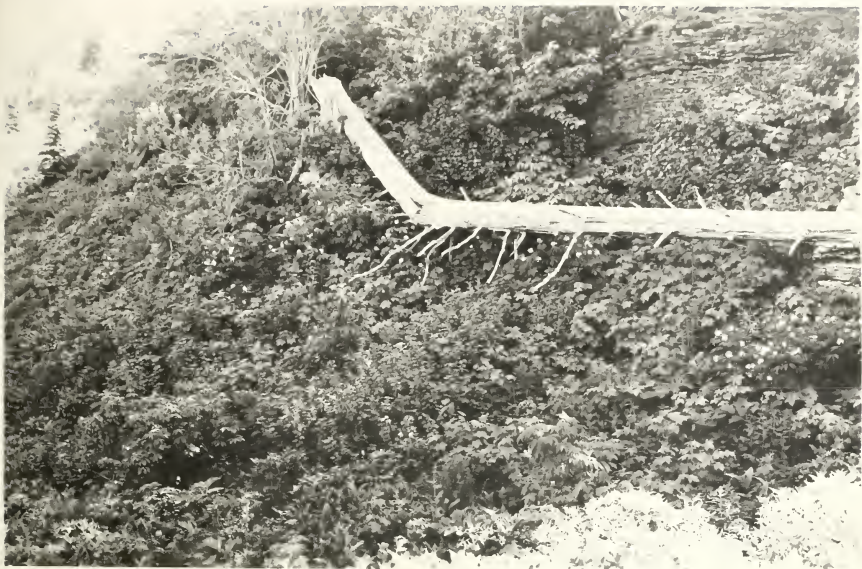


West Fork Big Creek. Bottom area treated with power sprayer in 1951.

W-55

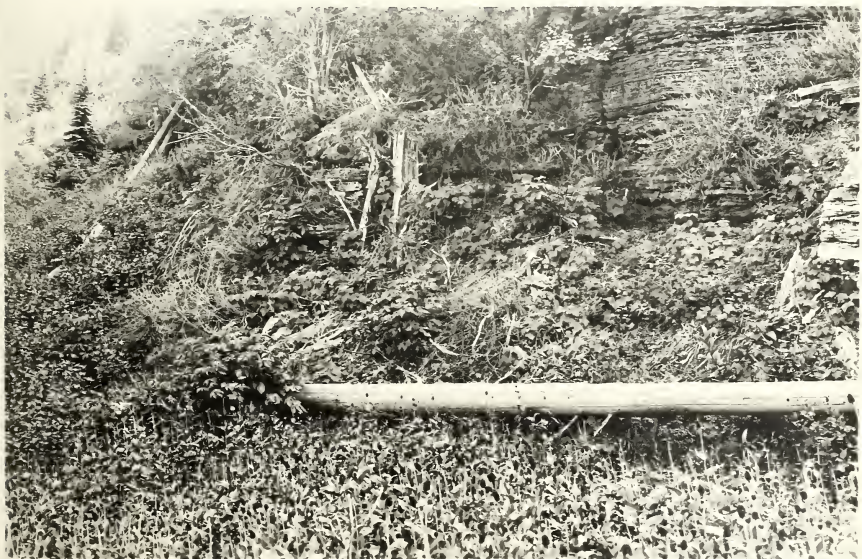






W-760

South Fork Marten Creek. Large masses of Ribes lacustre as they appeared before power spraying in 1950.



W-760-1

South Fork Marten Creek. One year after power spraying of rices pictured above.





### White Pine Creek Unit

Work should be resumed in the White Pine Creek unit in 1952 by a crew of 20 men starting immediately after receding of high water. Initial work remains to be done in the east portion of the unit which was not completed in 1949. Rework is needed in the fine plantation areas west of the main stream. Hi-Fog guns should be used to respray the seedlings and resprouts in the stream type.

A saving in camp construction costs as well as maintenance and supervision can be made if a road could be reopened at a nominal cost into the area.

### RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date,

TABLE 1

#### CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 CABINET OPERATION

Item	Bureau of Entomology and Plant Quarantine BLR-1-4	Forest Service BLR-4	Total
Salaries perm.	\$3,269	\$ 2,064	\$ 5,333
Sal. & Wages temp.		57,012	57,012
Subsistence supplies		10,875	10,875
Equipment	488	4,301	4,789
Travel and transp.	257	3,800	4,057
Other supplies	41	4,567*	4,608
Total	\$4,055	\$82,619	\$86,674

\*Includes Chemical and Helicopter



TABLE 2

RIBES ERADICATION BY AGENCIES  
CABINET OPERATION, 1951

Agency	State	Working	Acres	Man-Days	Ribes	Spray Gallons	Per Acre	
							Man-Days	Ribes
Forest Service	Montana	First	410	1,500	507,000	45,920	3.66	1,237
		Second	430	1,030	28,000	200	2.40	65
		Other	660	1,070	28,000	5,530	1.62	42
		Total	1,500	3,600	563,000	51,650	2.40	375

TABLE 2a

CONTRACT AND CHEMICAL WORK  
CABINET OPERATION, 1951

Agency	Working	Contract Work Completed					Chemical Work		
		Number Contracts	Acres	Man-Days	Ribes	Amount Paid	Acres	Man-Days	Gallons
Forest Service	First						192	570	45,920
	Second	1	70	90	15,000	\$1,560	10	20	200
	Third						200	190	5,530
	Total	1	70	90	15,000	\$1,560	402	780	51,650

TABLE 3

RIBES ERADICATION BY TYPES  
CABINET OPERATION, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Forest Service	Reproduction	370	420	520	1,310
	Stream	40	10	140	190
	Total	410	430	660	1,500



TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
CABINET OPERATION, 1951

State	Working	Acres Worked by Forest Service
		National Forest
Montana	First	410
	Second	430
	Other	660
	Total	1,500

TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
CABINET OPERATION, 1928-1951

State	Class	Workings				Man- Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man- Days	Ribes
Montana	Ev-Reg.	1,000	1,000		2,000	3,000	762,000	35,000	1.50	381
	Ev-Emerg.	32,000	1,000	1,000	34,000	16,000	3,840,000	1,000	.47	113
	FS-Reg.	17,000	10,000	6,000	33,000	48,000	4,449,000	95,000	1.45	135
	FS-Emerg.	50,000	1,000		51,000	51,000	6,991,000	22,000	1.00	225
	CCC	2,000	1,000		3,000	6,000	516,000		2.00	172
	Total	82,000	14,000	7,000	103,000	104,000	16,558,000	153,000	1.01	161

TABLE 6

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
CABINET OPERATION, 1928-1951

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Montana	National Forest	68,000	11,000	5,000	84,000	8,000	76,000
	State	1,000			1,000		1,000
	Private	14,000	2,000	2,000	18,000	4,000	18,000
	Subtotal S&P	15,000	2,000	2,000	19,000	4,000	19,000
	Total	83,000	13,000	7,000	103,000	12,000	95,000





CANADA

## LEGEND

AREAS IN PRESENT  
CONTROL PROGRAM

HIGH VALUE UNITS NOT  
IN PRESENT PROGRAM

HIGH POTENTIAL UNITS  
OF RECENT CUTOVER

HIGH VALUE UNITS  
OF MATURE STANOS

AREAS DROPPED FROM PROGRAM

INTERMINGLED UNITS

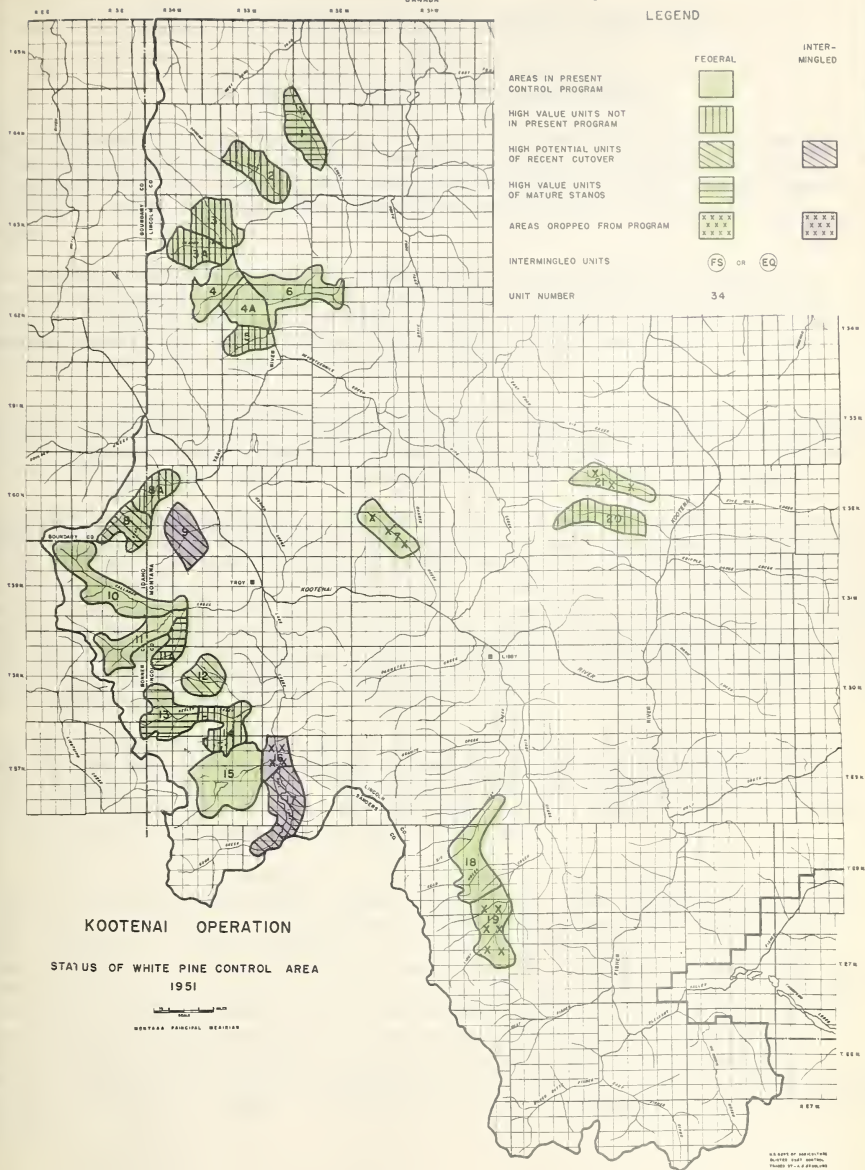
UNIT NUMBER

FEDERAL

INTER-  
MINGLED

FS OR EQ

34



## KOOTENAI OPERATION

STATUS OF WHITE PINE CONTROL AREA  
1951

Scale  
Miles  
NORTH ARROW  
NORTH ARROW



## BLISTER RUST CONTROL, KOOTENAI NATIONAL FOREST, 1951

By

A. S. Skoglund, Operation Supervisor  
M. D. Oaks, Forester, U. S. Forest Service

Ribes eradication in the Kootenai National Forest was concentrated in the two forks of Callahan Creek to conclude the initial phase of work in the seven units that have been selected for protection on basis of current annual appropriations. These locations also simplified transportation and supply to the camps.

For the third successive year the scheduled work was completed by August 31. The control program was materially aided by favorable weather throughout the season. Younger experienced overhead provided a stimulus that was reflected in greater production. This stimulus often fades with the continued employment of old-timers year after year in the same capacity.

Since the promotion of a safety consciousness among the workers, the number and severity of accidents has continually declined. Infection, resulting from minor cuts and bruises, cause some loss of man-days to the job that could be reduced if some of the newer antiseptics were made available for use in the camps.

South Fork Callahan Creek Unit. A 33-man pack camp was established near the upper forks of South Fork Callahan Creek on June 1. This drainage was logged between 1922 and 1925 with the cutting being done in a belt of 10 to 20 chains in width along each slope from the main stream. A mature stand of mixed species remains on the slopes beyond the cutting line. This older stand contains few ribes and serves as a screen to aid in limiting the spread of the disease. The ridge tops are generally ribes free and even in the 1945 burn near Smith M. Lookout no ribes have become established. There were, however, prior to first working, very heavy ribes throughout most of the cutover area.

Because of heavy blister rust damage on the upper ends of the cutover area, the control zone was extended from 3 to 15 chains up each fork to include all the cutover area. On these areas, totaling less than 100 acres, the working conditions were very difficult with over 600 ribes per acre being removed in contrast to less than 35 ribes per acre on the rework areas.

The areas of large concentrations of ribes were treated chemically with 2,4,5-T sprays. A Bean-Cutler portable power unit, together with necessary hose, chemical, and other supplies, was packed in 9 miles by mules. The chemical solution was pumped through a maximum of 900 feet of main line hose laid uphill from the power unit located on the stream. Two 300-foot lateral hoses were used from the main line. Pecan guns were used to broadcast spray the heavy concentrations of ribes. Because of this technique, only 1/3 to 1/4 as many man-days were required to effectively work these areas as compared to hand-pulling of similar areas in 1948. Further savings can be made with this procedure if a mixing container of 100-gallon capacity could be supplied to the job. This would provide a sufficient supply of solution to enable the pumpman to perform other duties.

Hi-Fog guns and knapsack units were used to spray ribes along streams and in isolated small blocks.

Approximately 67 percent of this unit is on maintenance. Three hundred and sixty acres were added as a result of this season's work. Due to the efficiency of the crews and improvement in work methods, only 84 percent of the scheduled man-day requirements were needed to complete current work.

Conditions conducive for the germination and growth of ribes still persist in the area west of the state line and south of the main stream. Numerous seedling Ribes lacustre were found in 1948, and it may be several years before ecological conditions become established to preclude further germination. The control zone extensions will require additional work. However, with proper timing a selective spraying of resprouts and crowns and a broadcast spraying of probable seedling areas should be sufficient to afford adequate protection.

North Fork Callahan Creek Unit. On June 12, a 33-man pack camp was started in North Fork Callahan Creek to perform both initial and rework in the 40-year-old stands. These stands are well-stocked and contain up to 30 percent white pine. Damage from blister rust is relatively light except in the areas bordering streams.

The topography in this unit is steep, and in order to provide an adequate protection zone in the Willard Creek fork area it was necessary to extend the boundaries 7-chains to the open ridge. Over 3,000 ribes per acre were removed from parts of this extended protective zone, whereas only 30 ribes per acre were destroyed on areas originally worked in 1940.

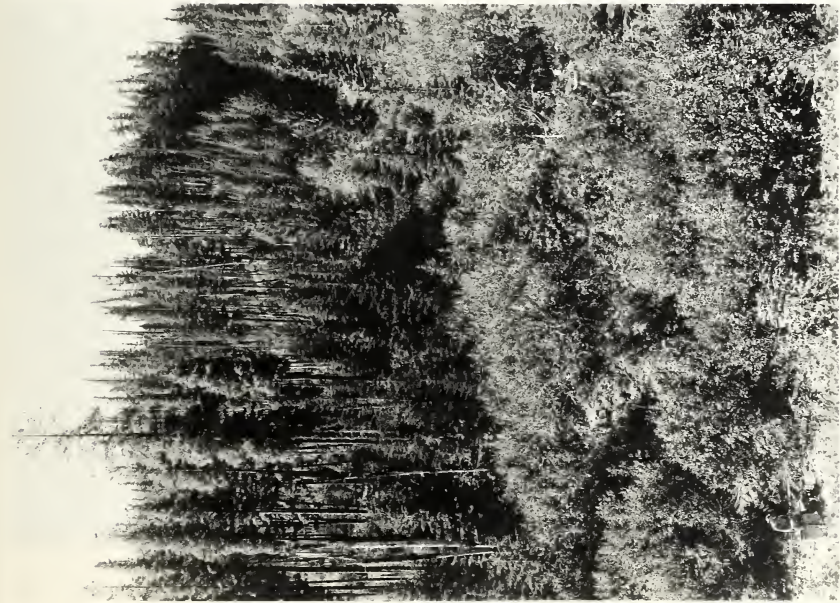
A total of 1,015 acres is now on maintenance which represents 63 percent of the area. One hundred and seventy-five acres were placed on maintenance as a result of this season's work.

Further work will be required in the 7-chain extension. Due to the number of ribes removed, a post check should be performed in 1953 on the area south of the main stream.

Star Creek Unit. During July, 50 man-days of work were expended in Star Creek plantations. This unit is being managed to restore white pine as the chief crop tree. This was originally an overmature stand containing considerable worthless timber. Starting in 1939, logging has removed most of the merchantable timber, and the residual stand is being progressively clear-cut and the area broadcast burned. Eighty acres thus treated were planted to white pine in 1951 which make a total of 320 acres rehabilitated. Less than one ribes per acre was found in this season's planted area. A survey of that portion of the area planted in 1945 revealed the need for an early season mop-up. Seedling R. viscosissimum continue to be found in the upper fringes where the fire was not intense enough to consume the viable seed. Few man-days will be needed to complete the work if done prior to leafing out of other brush species.

Spread Creek Unit. Forty man-days were spent in July to chemically treat with 2,4,5-T the ribes in several miles of the stream zone in Spread Creek. No eradication work has been done since 1935 in this drainage of predominately pole class stands. It is anticipated that work will be completed next season in the balance of the unit.





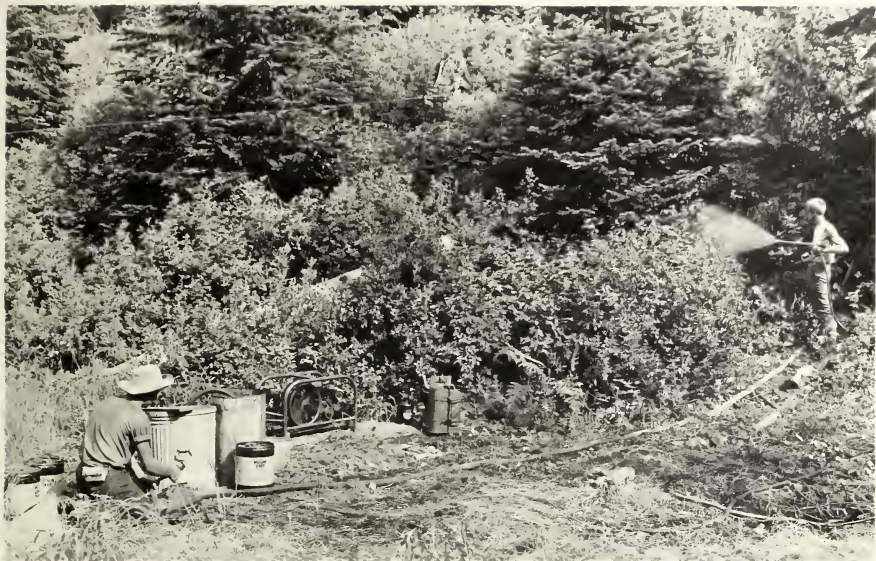
W-39  
South Fork Callahan Creek. Area logged 1932, ribes sprayed 1951 using portable power units and Hi-Fog guns.



W-40  
North Fork Callahan Creek unit area logged 1932, ribes sprayed 1951 using portable power unit. Smith Mt. Lookout in background.







Portable power spray unit with gravity feed water supply.

W-52



Star Creek. Stand improvement area. Area logged 1940, broadcast burned 1942, planted 1945.

W-48



# RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

## CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 KOOTENAI OPERATION

Item	Bureau of Entomology and Plant Quarantine BLR-1-4	Forest Service BLR-4	Total
Salaries, perm.	\$3,269	\$ 6,599	\$ 9,868
Sal. & Wages temp.		46,227	46,227
Subsistence supplies		12,388	12,388
Equipment	488	1,197	1,685
Travel and transp.	257	2,331	2,588
Other supplies	41	1,101	1,142
Total	\$4,055	\$69,843	\$73,898



TABLE 2

RIBES ERADICATION BY AGENCIES  
KOOTENAI OPERATION, 1951

Agency	State	Working Acres	Man-Days	Ribes	Spray Gallons	Per Acre	
						Man-Days	Ribes
Forest Service	Montana	First	660	690	116,000	4,490	1.05
		Second	920	1,090	44,000	100	1.18
		Other	830	690	20,000	10	.83
		Total	2,410	2,470	180,000	4,600	1.02

TABLE 2a

CHEMICAL WORK  
KOOTENAI OPERATION, 1951

Agency	Working Acres	Chemical Work		
		Acres	Man-Days	Gallons
Forest Service	First	50	190	4,490
	Second	40	60	100
	Other	5	10	10
	Total	95	260	4,600

TABLE 3

RIBES ERADICATION BY TYPES  
KOOTENAI OPERATION, 1951

Agency	Type	Working			
		First Acres	Second Acres	Other Acres	Total Acres
Forest Service	Plantation 1950-54	80			80
	Cutover 1940-49	130	50		180
	Reproduction 1910-39	50	180	510	740
	Pole	330	530	70	930
	Mature	60			60
	Stream	10	160	250	420
	Total	660	920	830	2,410





TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
KOOTENAI OPERATION, 1951

State	Working	Acres Worked by Forest Service
		National Forest
Montana	First	660
	Second	920
	Other	830
	Total	2,410

TABLE 5

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
KOOTENAI OPERATION, 1935-1951

State	Class	Workings				Man- Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man- Days	Ribes
Montana	Ex-Emerg.	32,000			32,000	15,000	1,925,000		.47	60
	FS-Reg.	21,000	7,000	1,000	29,000	26,000	2,318,000	28,000	.90	80
	FS-Emerg.	4,000	1,000		5,000	5,000	377,000		1.00	75
	CCC	11,000			11,000	7,000	956,000		.64	87
	Total	68,000	8,000	1,000	77,000	53,000	5,586,000	28,000	.69	73

TABLE 6

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION  
KOOTENAI OPERATION, 1935-1951

State	Ownership	Net Acres in Control Area					
		Acres Worked				Unworked	Total Acres
		First	Second	Other	Total		
Montana	National Forest	60,000	7,000	1,000	68,000	39,000	99,000
	Private	4,000	1,000		5,000	10,000	14,000
	Total	64,000	8,000	1,000	73,000	49,000	113,000



## BLISTER RUST CONTROL, MOUNT RAINIER NATIONAL PARK, 1951

By

J. C. Gynn, Operation Supervisor

C. M. Chapman, Pathologist

The 1951 white pine blister rust control program in Mount Rainier National Park consisted of re-eradication on the White River control unit. The National Park Service administered the project; Bureau of Entomology and Plant Quarantine furnished coordination and technical direction. The work plan was designed to first eliminate ribes concentrations on cliffs and precipitous slopes causing damage to near-by white pine reproduction in the Sunrise Park area above. If time allowed, maintenance work was planned in the vicinity of the Sunrise Point parking area. Because of extreme forest fire danger during part of the summer, the work plan was reversed in order to keep the crew more readily available for fire control. Although the maintenance work was well performed, only a small amount of the higher priority work in the cliff areas could be completed.

Ribes eradication. Acres worked, 710; man-day per acre, .75; ribes removed per acre, 17. A superintendent, a checker, and 8 laborers were employed. Work started June 15 and continued through September 8. Illustrated charts were used to teach methods of ribes eradication and show procedures and techniques in field application. Actual training in the field included the use of chemical equipment, spraying techniques, and instruction in the one-man dragline system. Stream type ribes were treated with 2,4,5-T using manually operated trombone pumps. The dragline system was used in the upland.

Checking and control status. A systematic check was made of the White River control unit before working to delimit ribes-free portions. All areas worked were checked for efficiency and mop-up work performed accordingly. The entire White River Control unit is now classified for control status as follows: maintenance, 2,400 acres; post check, 140 acres; rework, 660 acres. Control status of the Longmire-Silver Forest control unit remains unchanged.

Blister rust infection. A disease survey was run between Sunrise Point and the Sunrise Park campground south of the road to the cliffs. White pine (Pinus albicaulis) reproduction less than 5 feet in height was examined with the following results: white pine per acre, 105; number of trees examined, 602; number of trees infected, 331; number of trees with trunk cankers, 14. The youngest infection noted was in 1947 wood and of 1948 origin. The last ribes eradication influencing the area sampled was done in 1949.

### RECOMMENDATIONS

Longmire-Silver Forest. Inspections made in 1951 showed no maintenance work necessary in 1952.

White River. It is recommended the cliff and precipitous slope areas not completed in 1951 be worked in 1952. All additional rework should be performed as determined necessary by the latest checking and control status information available.

The following estimate is made to accomplish the work: for a 3-month period beginning approximately June 9, 1952, a crew composed of a superintendent, a checker, and 8 crewmen should be employed. Estimates are based on a 6-day work week. Additional men should be hired at the start to take care of man-day losses caused from late arrivals, quits, and those leaving early for school.

### RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

#### CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 MOUNT RAINIER NATIONAL PARK

<u>Item</u>	<u>National Park Service</u>
Personal Service	\$7,910.42
Communication Services	7.16
Contractual Service	—
Supplies and Materials	820.52
Salary, Checker	<u>955.47</u>
Total	<u>\$9,693.57</u>

TABLE 2

SUMMARY OF RIBES ERADICATION  
MOUNT RAINIER NATIONAL PARK, 1951

Area	Working	Acres	Man-Days	Ribes Species		Total Ribes	Spray Gallons 2,4,5-T	Per Acre	
				Ribes lacustre	Ribes laxiflorum			Man-Days	Ribes
White River	Other	710	530	11,000	1,000	12,000	170	.75	17

Not included above  
36 Man-Days - Canker Elimination

Chemical work included above:

	Working Acres	Man-Days	Spray Gallons
Other	70	80	170

TABLE 3

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
MOUNT RAINIER NATIONAL PARK, 1930-1951  
(GROSS ACRES WORKED)

State	Class	Working				Man-Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Washington	NP-Reg.	2,660	1,130	9,640	13,430	12,810	1,170,000	3,810	.95	87
	NP-CCC	5,610	3,560	1,790	10,960	12,690	1,293,000		1.16	113
	Total	8,270	4,690	11,430	24,390	25,500	2,463,000	3,810	1.05	101

TABLE 4

SUMMARY OF RIBES ERADICATION  
MOUNT RAINIER NATIONAL PARK, 1930-1951  
(NET CONTROL AREA)

Area	Working				Man-Days	Total Ribes	Spray Gallons	Per Acre	
	First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Longmire-Silver Forest	1,300	1,290	3,700	6,290	7,250	636,000	370	1.15	101
White River	3,200	3,010	7,520	13,730	9,840	958,000	3,440	.72	70
Total	4,500	4,300	11,220	20,020	17,090	1,594,000	3,810	.85	80

Chemical work included above:

	Working Acres	Man-Days	Spray Gallons
Second	60	60	180
Other	610	690	3,640
Total	670	750	3,820





## BLISTER RUST CONTROL, GLACIER NATIONAL PARK, 1951

By

J. O. Gynn, Operation Supervisor

C. M. Chapman, Pathologist

Blister rust control work in Glacier National Park was performed on the East Glacier and Lake McDonald control units. The project was supervised and administered by the National Park Service. The Bureau of Entomology and Plant Quarantine furnished the technical supervision.

East Glacier. Ribes eradication consisted of rework only. The East Glacier area was difficult because all ribes bushes were small, scattered, and well hidden among the stream type brush and tall grass. The cliffs bordering the campgrounds are hazardous requiring slow work with specially trained crews. With the exception of cliff work and 10 acres of seedling patches treated by broadcast spraying with 2,4,5-T, the one-man dragline system was used exclusively. All work was completed as previously scheduled. Acres reworked, 330; man-days per acre, 1.7; ribes removed per acre, 73. A superintendent and 10 crewmen were employed. Work started June 12 continuing to September 1. The crew then moved to the Lake McDonald area. Actual field training included search and identification of ribes, broadcast spraying techniques, and instruction in the one-man dragline system. Training charts were used to illustrate ribes identification and introduce procedures for maximum efficiency and production. A check on the area was made in advance of the work to determine location of ribes, seedling patches, and to delimit portions free of ribes. Eradication work was checked daily and mop-up performed accordingly. A final check on the entire East Glacier control unit resulted in the following control status classifications: maintenance, 322 acres; post check, 124 acres.

Lake McDonald. Acres reworked, 130; man-days per acre, 0.38; ribes removed per acre, 8. Work started September 1 by the experienced East Glacier crew, continuing through September 19. Termination of season prevented an adequate final check. The status of control of the Lake McDonald unit will remain unchanged until 1952 when additional rework and intensive checking will be performed and a reclassification for control status made.

Blister Rust Infection. Systematic disease surveys were performed on the Park Headquarters and East Glacier areas with the following results:

<u>Area</u>	<u>Tree Species</u>	<u>Trees Examined</u>	<u>Trees Infected</u>	<u>Trees with Trunk Cankers</u>	<u>Tree Size</u>
Park Headquarters	<u>Pinus monticola</u>	546	87	8	Reproduction
East Glacier	<u>Pinus flexilis</u>	164	31	3	Pole

Infection increase since last reporting is primarily due to 1947 and earlier infection present but yet not visible during the 1948 survey. Ribes eradication work was last performed on the Park Headquarters area in 1948. Last workings previous to 1951 were performed on the East Glacier area in 1947 and 1949. No infection has been found in either area of later than 1947 origin.

## RECOMMENDATIONS

Park Headquarters. In 1952 perform all rework shown as necessary by the latest checking and control status data. Use the one-man dragline system on all areas in conjunction with broadcast spraying of ribes seedlings with 2,4,5-T. A check should be made of the entire control unit.

Lake McDonald. In 1952 complete all work determined necessary by checking and control status information. Using Hi-Fog guns with 2,4,5-T, selectively broadcast spray all the Snyder Creek stream type. The dragline system should be used on all other rework areas in conjunction with broadcast spraying of ribes seedlings. A check should be made of the entire control unit.

Oldman Lake. An early spring inspection of the eastern protection zone showed additional rework is urgently necessary and should be performed not later than 1952. It was originally planned to perform this work in 1951 and rework the main Oldman Lake control unit in 1953. National Park Service officials agreed doing both jobs in 1952 would greatly reduce costs by eliminating 1 year's camp installation and maintenance. About six men of the crew should be temporarily camped at the eastern control boundary as early in June as possible to begin power spraying of ribes concentrations in the protection zone. As soon as snow conditions permit, several men should be used to rehabilitate the lake shore camp in preparation for balance of crew arrival about July 7. All rework should be performed as determined necessary by the latest checking data. Chemical methods should be used where adaptable to reduce cost and increase efficiency.

Estimates. The following 1952 estimate is made to accomplish the work: For a complete 3-month period beginning approximately June 9 a crew composed of 1 superintendent (GS-6), 1 foreman (GS-5), 1 checker (GS-5), and 26 crewmen should be employed. Estimates are based on a 6-day work week. The entire crew should report for training in the Park Headquarters and Lake McDonald areas. All but three men and one foreman should be transferred to the Oldman Lake unit when and as designated by the work plan.

## RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

### CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 GLACIER NATIONAL PARK

Item	National Park Service
Personal Service	\$8,227.81
Travel & Transportation	89.45
Rents	295.98
Supplies & Materials	792.91
Total	\$9,406.15

TABLE 2

SUMMARY OF RIBES ERADICATION  
GLACIER NATIONAL PARK, 1951

Area	Working	Acres	Man-Days	Ribes Species			Total Ribes	Spray Gallons	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes inerme			Man-Days	Ribes
Lake McDonald	Other	130	50	1,000			1,000		.38	8
East Glacier	Other	330	560	15,000	1,000	8,000	24,000	30	1.70	73
Total	All	460	610	16,000	1,000	8,000	25,000	30	1.33	54

Chemical work included above:

Spray

	Working Acres	Man-Days	Gallons
Other	10	10	30

TABLE 3

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
GLACIER NATIONAL PARK, 1930-1951

State	Class	Working				Man-Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Montana	NP-Reg.	1,850	2,150	2,860	6,860	8,310	770,000	3,780	1.21	112
	NP-CCC	2,530			2,530	2,830	324,000		1.08	123
	NP-CPS	660	1,470	650	2,780	2,290	214,000		.82	77
	Total	5,140	3,620	3,510	12,270	13,430	1,308,000	3,780	1.09	107

TABLE 4

SUMMARY OF RIBES ERADICATION  
GLACIER NATIONAL PARK, 1939-1951

Area	Working				Man-Days	Ribes	Spray Gallons	Per Acre	
	First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Park Headquarters	690	620	700	2,010	1,030	131,000		.51	65
Two Medicine	710	680	850	2,240	2,720	323,000	280	1.21	144
Lake McDonald	1,780	1,780	1,340	4,900	3,180	164,000		.65	33
East Glacier	440	390	620	1,450	3,020	321,000	60	2.08	221
Oldman Lake	1,520	150		1,670	3,480	369,000	3,440	2.08	221
Total	5,140	3,620	3,510	12,270	13,430	1,308,000	3,780	1.09	107

Chemical work included above:

Spray

	Working Acres	Man-Days	Gallons
First	120	460	3,290
Second	40	30	150
Other	90	120	340
Total	250	610	3,780





## BLISTER RUST CONTROL, YELLOWSTONE NATIONAL PARK, 1951

By

J. C. Gynn, Operation Supervisor

C. M. Chapman, Pathologist

The Yellowstone National Park white pine blister rust control program for 1951 consisted of ribes eradication work in the Mount Washburn and Craig Pass control units as previously scheduled.

Mount Washburn. From control status data and other factors, rework was determined necessary on 1,200 acres initially treated in 1949. A portion of the area was not completed because of late snow, rain, and other causes. Results were as follows: Acres reworked, 810; average man-days per acre, 1.04; average ribes per acre, 54; acres treated chemically, 130; gallons of spray, 950. The 10 acres of initial cliff work remaining in the area proved too hazardous for working with conventional rope and harness methods. Attempts will be made to eliminate the few ribes remaining with an adaptation of the basal stem chemical method. A superintendent, a checker, and 13 crewmen were employed. Work started June 19 and continued through September 14. The one-man dragline method was used on most upland areas as the ribes were widely scattered making the chemical method impractical. Most all ribes eradicated were seedlings. Ribes occurring in stream type were treated by selective broadcast spraying with 2,4,5-T. The entire Mount Washburn control unit is now classified for control status as follows: Maintenance, 2,530 acres; post check, 1,070 acres; rework, 1,090 acres. Post checking at a later date will determine amount of any necessary future work. Random inspections of the seedling beds treated by broadcast spraying with 2,4,5-T in 1950 showed the method to be entirely successful and it will be used on similar areas where necessary.

Craig Pass. Acres reworked, 60; man-day per acre, 0.5; ribes removed per acre, 67; acres chemically treated, 60; gallons of Hi-Fog gun spraying concentrate, 40. The work consisted of treating scattered seedling patches by broadcast spraying with 2,4,5-T using Hi-Fog guns. This eliminated the high cost of searching for individual seedlings. Only six mature bushes were found. The area was initially worked in 1947. No additional ribes eradication work should be necessary in the Craig Pass area for a number of years.

Blister rust infection. For the first time blister rust infection was found in the Mount Washburn area. The one canker found was on a small white pine (*Pinus albicaulis*) at the outer edge of the western protection zone. The infection was of 1945 origin. In the immediate vicinity, 730 additional trees were examined with negative results. Outside the control boundary near the infected tree, 300 ribes were examined for the rust with negative results. This find substantiates previous reports of the disease gradually spreading throughout the Park. It also shows infection on white pine has been present in the Park longer than previously known because the only other infection found on white pine in the Park (near Mammoth Hot Springs in 1950) was of 1948 origin.

## WEST FORK OF CARNELIAN CREEK SURVEY

At the request of the National Park Service, a survey was conducted on the west fork of the Carnelian Creek drainage to secure information on which to base a decision for extending the Mount Washburn control unit to include this area.

A systematic white pine and ribes distribution survey was made and stand composition information compiled accordingly. Maps, man-day estimates, and working recommendations were prepared for National Park Service use. The survey results were as follows:

Size of extension area: 3,500 acres

Ribes species: Ribes lacustre, R. viscosissimum, R. petiolare, R. cereum, and R. montigenum.

Working conditions: Vary from light to heavy. A portion of the area lends itself well to chemical ribes eradication.

Accessibility: No roads or trails transect the drainage. Many good pack camp sites are available in strategic locations throughout the area.

Effective man-day and chemical estimates for initial working: Total man-days, 4,913; man-days per acre, 1.4; chemical concentrate 2,4,5-T required for first year working, 150 gallons.

Recommendations: Ribes eradication should begin in June 1952. The disease found in the immediate vicinity in 1951 increases the urgency of the work if the drainage is to be protected. A temporary pack camp should be used rather than spending much time and effort walking to the work areas from the nearest truck road. Yellowstone Park officials agree the work should be performed over a 3-year period using a crew composed of 23 men, 1 camp superintendent, and 1 checker on a 6-day work week basis each year.

The west fork of the Carnelian Creek drainage constitutes a good control unit extension with natural topographic barriers on three sides. It is an unusually fine example of white bark pine (Pinus albicaulis) type occurring in the Park.

#### RECOMMENDATIONS

Mammoth. In 1952, using the one-man dragline and chemical broadcast methods, perform all rework shown as necessary by the 1950 post check data.

The following estimate is made to accomplish the work: A roximately 400 effective man-days will be required. For a complete 3-month period beginning about June 9, 1952, a crew composed of one superintendent GS-6 and seven crewmen is recommended. Estimates are based on a 6-day work week. If all work is completed as scheduled, the Mammoth blister rust control unit should require only a small amount of occasional spot working for future control.

Mount Washburn. No ribes eradication work is planned for the present Mount Washburn control unit in 1952. The rework unfinished in 1951 can be included with rework scheduled for 1953.

Craig Pass. No additional work should be required for a number of years. The area should be post checked in 1954 to determine status of control.





W-383

Mount Washburn Unit: Ground disturbance caused by former method of digging Ribes montigenum. Ribes seeds germinate on disturbed area for several years.



W-381

Mount Washburn Unit: Ribes montigenum killed with 2,4,5-T, using Hi-Fog guns. Note lack of ground disturbance. Seedlings seldom occur following this method of ribes eradication. Chemical has no effect on the trees.



## RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

### CLASSIFIED EXPENDITURES, CALENDAR YEAR 1951 YELLOWSTONE NATIONAL PARK

<u>Item</u>	<u>National Park Service</u>
Personal Services	\$11,920.83
Travel & Transportation	4.59
Communication Service	7.22
Contractual Services	214.27
Supplies & Materials	1,563.44
Salary, Checker	969.20
Total	\$14,679.55



TABLE 2

SUMMARY OF RIBES ERADICATION  
YELLOWSTONE NATIONAL PARK, 1951

Area	Working	Acres	Man-Days	Ribes Species				Total Ribes	Spray Gallons	Per Acre	
				Ribes lacustre	Ribes viscosissimum	Ribes inerme	Ribes montigenum			Man-Days	Ribes
Mount Washburn	Second	750	790	23,000	1,000	2,000	10,000	36,000	750	1.05	48
	Other	60	50	5,000			3,000	8,000	200	.83	133
	Total	810	840	28,000	1,000	2,000	13,000	44,000	950	1.04	54
Craig Pass	Second	60	30			4,000		4,000	40	.50	67
	Total	870	870	28,000	1,000	6,000	13,000	48,000	990	1.00	55

Chemical work included above:

Area	Working Acres	Spray	
		Man-Days	Gallons
Mt. Washburn	Second	100	150
	Third	30	40
Craig Pass	Second	60	30

TABLE 3

SUMMARY OF RIBES ERADICATION BY PROGRAMS  
YELLOWSTONE NATIONAL PARK, 1945-1951

State	Class	Working				Man-Days	Ribes	Spray Gallons	Per Acre	
		First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Wyoming	MP-Reg.	8,020	3,140	210	11,370	9,510	1,324,000	17,080	.84	116
	NP-CPS	1,570			1,570	990	96,000	760	.63	61
	Total	9,590	3,140	210	12,940	10,500	1,420,000	18,840	.81	110

TABLE 4

SUMMARY OF RIBES ERADICATION  
YELLOWSTONE NATIONAL PARK, 1945-1951

Area	Working				Man-Days	Total Ribes	Spray Gallons	Per Acre	
	First Acres	Second Acres	Other Acres	Total Acres				Man-Days	Ribes
Mammoth	1,580	1,480	150	3,210	1,810	199,000	2,790	.56	62
Mount Washburn	4,690	1,600	60	6,350	8,270	1,195,000	16,010	1.30	188
Craig Pass	3,320	60		3,380	420	26,000	40	.12	8
Total	9,590	3,140	210	12,940	10,500	1,420,000	18,840	.81	110

Chemical work included above:

	Working Acres	Spray	
		Man-Days	Gallons
First	400	1,190	15,890
Second	280	320	2,300
Other	40	70	610
Total	720	1,580	18,800

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## BLISTER RUST CONTROL, ROCKY MOUNTAIN NATIONAL PARK, 1951

By

J. C. Gynn, Operation Supervisor  
C. M. Chapman, Pathologist

Initial ribes eradication work in the Longs Peak-Estes Cone white pine blister rust control unit was completed in 1951. A small amount of rework was performed in the protection zone. Effective man-days expended to accomplish all initial work in the entire control unit were 1,246 less than originally estimated. This large saving is primarily the result of the chemical 2,4,5-T used as a method of ribes eradication. All ribes species occurring in that particular locale were tested to determine their susceptibility to the chemical before it was employed in actual field work.

Ribes eradication. Acres initially worked, 2,900; man-day per acre, .61; ribes removed per acre, 31. Acres reworked, 130; man-day per acre, .69; ribes removed per acre, 8. A superintendent, a checker, 2 foremen, and 35 crewmen were initially employed. The crew averaged 28 men for a 3-month period beginning June 11, 1951. The chemical method using 2,4,5-T with manually operated trombone pumps was used for treating all stream type ribes. Hi-Fog guns with a more concentrated solution of 2,4,5-T were used for treating ribes intermingled with dense prostrate white pine and fir growing at the 10,000 to 12,000 ft. elevations. Inspections of the eight chemical basal stem test plots established in 1950, showed Ribes cereum can be successfully eliminated by treating only the basal stem and root crowns with 2,4,5-T in diesel oil. This method employed for eliminating R. cereum on precipitous rocky slopes in the northeast portion of the area resulted in reduced costs. The one-man dragline system was used on other portions of the area where feasible. Men were carefully selected as to physical adaptability and stamina for working at the higher elevations. Men best suited for a particular method of ribes eradication were intensively trained in that method and placed in crews accordingly. Field training included search and identification of ribes, use of chemical equipment, spraying techniques, and instruction in the one-man dragline system. Charts were used to introduce methods used to secure maximum efficiency and production.

Checking and control status. A systematic advance check had been previously run on the area. From these data, portions of the area were determined as being nearly ribes free and carefully scouted for scattered ribes by a specially trained crew. The 6,100 acres comprising the entire control unit have been classified as follows: maintenance, 3,720 acres; post check, 1,140 acres; rework, 1,240 acres.

The disease. No white pine blister rust (Cronartium ribicola) has been found in Rocky Mountain National Park.

### RECOMMENDATIONS

In June 1952, perform a check on all areas classified for post check, in the south half of the control unit. Perform all rework determined necessary by the latest checking and control status data in the south half of the control unit. Eliminate all upland ribes present in the upper portions of the Alpine and Inn Brook drainages by treating with 2,4,5-T using Hi-Fog guns. All stream type work should be performed by the chemical method using manually operated trombone

pumps with 2,4,5-T. The dragline system should be employed on all remaining work areas.

The following 1952 estimate is made to accomplish the work: For a complete 3-month period beginning approximately June 9, 1952, a crew composed of a superintendent (GS-6), a checker (GS-5), and 20 crewmen is recommended. Estimates are based on a 6-day work week. Approximately 75 gallons of 2,4,5-T will be required. Several additional men should be hired at the start to make up man-day losses caused from rain, fire, and crew reductions resulting from quits, discharges, and those leaving early for school.

#### RESULTS

The following tables show expenditures, results of the 1951 field work, and accumulative results of work performed to date:

TABLE 1

#### CLASSIFIED EXPENDITURES CALENDAR YEAR 1951 ROCKY MOUNTAIN NATIONAL PARK

<u>Item</u>	<u>National Park Service</u>
Personal Services	\$24,839.79
Travel & Transportation	4.65
Rents	1,261.19
Contractual Services	363.95
Supplies and Materials	2,057.63
Salary, Checker	384.10
Total	<u>\$28,911.31</u>

TABLE 2

SUMMARY OF RIBES ERADICATION  
ROCKY MOUNTAIN NATIONAL PARK, 1951

Area	Working	Acres	Man-Days	Ribes Species					Total Ribes	Spray Gallons	Per Acre	
				Ribes lacustre	Ribes setosum	Ribes cereum	Ribes coloradense	Ribes montigenum			Man-Days	Ribes
Longs Peak-Estes Cone	First	2,900	1,780	22,000	16,000	12,000	10,000	29,000	89,000	4,710	.61	31
	Second	130	90		1,000				1,000	70	.69	8
	Total	3,030	1,870	22,000	17,000	12,000	10,000	29,000	90,000	4,780	.62	30

Chemical work included above:

	Working Acres	Man-Days	Spray Gallons
First	240	760	4,710
Second	10	10	70
Total	250	770	4,780

TABLE 3

SUMMARY OF RIBES ERADICATION  
ROCKY MOUNTAIN NATIONAL PARK, 1950-1951

Area	Working			Man-Days	Ribes	Spray Gallons	Per Acre	
	First Acres	Second Acres	Total Acres				Man-Days	Ribes
Longs Peak-Estes Cone	6,100	130	6,230	4,220	318,000	8,620	.68	51

Chemical work included above:

	Working Acres	Man-Days	Spray Gallons
First	470	1,540	8,550
Second	10	10	70
Total	480	1,550	8,620





W-390

Hi-Fog gun mounted on U. S. Army type packboard. Used extensively for treating ribes with chemical at the 10,000 to 12,000 ft. elevations where adequate water supply is not available. Note scarifier attached to nozzle.



W-326

Longs Peak-Estes Cone Unit: Spraying ribes in prostrate white pine and fir with 2,4,5-T, using Hi-Fog gun. Longs Peak and Mount Lady Washington appear in background.









W-322

Longs Peak-Estes Cone Unit: Early season spraying of Ribes cereum on rocky slope of Estes Cone with 2,4,5-T, using Hi-Fog gun. Note ribes bushes are still in budding stage. A complete kill resulted.



W-316

Ribes cereum killed by treating only basal stems and crowns with 2,4,5-T in diesel oil, using Hi-Fog guns and manually operated trombone pumps. This method was first employed in the Northwestern Blister Rust Control Project in the Rocky Mountain National Park during 1951.





W-341  
Longs Peak-Estes Cone Unit: Pinus flexilis (limber pine) representing stand composition of the main control area. Estes Cone visible in background.





# DEVELOPMENTAL WORK IN METHODS OF RIBES ERADICATION, AND PROGRESS OF RIBES ECOLOGY AND DISEASE CONTROL STUDIES IN THE NORTHWESTERN PROJECT FOR 1951

By

V. D. Moss, Forest Ecologist; R. T. Bingham, Pathologist;  
and J. F. Breakey, Pathologist

## SUMMARY OF PROJECT WORK FOR 1951

Personnel in the Developmental and Improvement Project in 1951 worked on the following problems in blister rust control: Moss on the development and improvement of physical, chemical, and mechanical methods of ribes eradication, and on ribes ecology in relation to control work and white pine management; Breakey on the development and improvement of spray equipment; and Bingham on the development of rust resistant white pine, on a study extending blister rust damage surveys to mature western white pine stands, and on establishment of effectiveness of control study plots on a near maintenance area.

Developmental work in chemical methods of ribes eradication included (1) checking results of herbicides tested in 1950, (2) establishing tests of new formulations of 2,4,5-T, and of adjuvants to increase the wetting and penetration of spray solutions, and (3) testing a number of chemicals for canker elimination on infected white pines.

Tests in 1950 broadcast spraying 2,4,5-T by truck-mounted power sprayer to recent cutover lands resulted in a satisfactory kill of ribes seedlings at 1,500 p. p. m. acid equivalent. When the ribes population contains *Ribes lacustre*, the concentration of 2,4,5-T should be increased to 2,000 p. p. m. (a.e.). To adequately drench root crowns and wet stems, leaves, and tips of all growing shoots from 200 to 300 gallons of spray solution per acre should be broadcast uniformly. The Pecan Gun nozzle fitted with a No. 4 or 5 disc results in the smallest man-days per acre charge for spraying. Pine damage from broadcast spraying will be higher with the Pecan Gun than with the Bean Majestic nozzle. The Bean nozzle mounted on a 1/8-inch diameter 3-foot long iron pipe extension can be held close to the ground to direct spray selectively away from pine to ribes and ribes sites. The aqueous formulation of 2,4,5-T for seedling ribes should include 1 percent oil emulsion as a wetting agent.

Similar tests in broadcast spraying 2,4,5-T by truck-mounted power sprayer to older cutover lands resulted in a satisfactory kill of mature ribes at 2,000 p. p. m. (a.e.). From 200 to 300 gallons of spray solution per acre should be uniformly distributed, drenching crowns of ribes over 1 foot in height; also wetting stems, leaves, and tips of all growing shoots. The Pecan Gun nozzle fitted with a No. 5 or 4 disc also results in the smallest man-days per acre charge for spraying mature ribes on older cutover lands. If pine is small and underneath ribes, the Bean Majestic nozzle with a No. 3 disc can be employed to reduce damage from spraying. Include 1 percent oil emulsion as a wetting agent in the aqueous solution of 2,4,5-T.

Basal stem treatment, applying 5 percent 2,4,5-T a.e. by weight diluted in stove or Diesel oil to the lower foot of stems and root crown, is an effective method of ribes eradication any time during the field season. However, this type of

treatment was developed for early season and late season work when it is impractical to apply foliage spray. In addition, it is recommended for treating troublesome patches of large ribes during the regular growing season.

Results in applying 2,4,5-T by helicopter are effective on areas of seedling ribes where conditions permit flying close to the ground. Satisfactory results also are obtained in treating mature ribes on areas largely inhabited by the single species R. viscosissimum. Applying spray by helicopter is not yet a practical method for treating mature R. lacustre bushes because this species is resistant to low volume foliage spray. However, spraying by helicopter can facilitate ground methods of eradicating R. lacustre by killing the associated vegetative cover so ribes can be found and travel conditions made easier. Tests in reapplying 2,4,5-T by helicopter show the respray effective on areas of seedling ribes screened by other vegetation on initial treatment, and on areas where mature R. viscosissimum has resprouted after initial spray treatment. Chemical should be applied on initial and respray at the rate of 1 pound of 2,4,5-T a.e. per acre. The dosage rate should be 10 gallons of the aqueous spray solution per acre. The aqueous spray solution should contain 1 percent oil emulsion as a wetting agent.

In 1951, four new formulations of parent 2,4,5-T acid were tested and many adjuvants as penetrants and wetting agents. The adjuvants are to be compared with the effectiveness of an aqueous solution of 2,4,5-T without and with the addition of 1 percent oil emulsion as a wetting agent. Spray plots include both R. viscosissimum and R. lacustre located on the four north Idaho forests. Tests were replicated from mid-June to mid-September. Spray solution was applied with the knapsack unit drenching root crowns and wetting stems, leaves, and tips of all growing shoots.

A number of chemicals possessing fungicidal or herbicidal properties were tested for canker elimination on infected white pine. This project was established in the Solitaire Creek white pine plantation on the Coeur d'Alene National Forest. Two or more concentrations of each chemical in 2 gallons of aqueous solution were applied as a foliage spray to five infected trees. Screening tests of a few chemicals in 1949 and 1950 showed acti-dione and 2,4,5-T sprays causing a rapid acceleration of flagging or dying of infected branches, in some cases death of the canker alone. The two chemicals in combination induced these effects on infected white pine better than either alone. Most of the tests made this season were of acti-dione concentrations, combining them with various formulations of parent 2,4,5-T acid, or adding wetting and penetrating agents to facilitate coverage and absorption of spray solution.

In the development and improvement of spray equipment, Mr. J. F. Breakey designed and supervised alterations in adapting a power turbine blower for forest spraying. New type nozzles were constructed which introduced the spray solution in the center of the air stream in place of from the outside edges. Work also was done in improving power truck and trailer-mounted sprayers and accessories. Late model back-pack sprayers and pumps were studied for possible improvement over present knapsack units and Hi-Fog guns.

Blister rust damage surveys were extended to mature western white pine stands this year by Mr. R. T. Bingham. After developing survey methods, Bingham trained crews in high-climbing methods and assisted Forest Service personnel in supervising



survey crews, and in analyzing survey data. Equipment included regular telephone lineman's climbers augmented by specialized gear consisting of two wire-core rope safety lanyards for climbing the larger trees. After 2 weeks in training, the crews surveyed Bird Creek, Gold Creek, and Simmons Creek in the St. Joe National Forest. In these drainages the mature trees examined averaged 111 years old, 122 feet tall, and 19 inches in diameter breast high. About 64 percent of the 268 trees sampled had trunk cankers or had lethal branch cankers believed capable of reaching trunk. Average height of lethal cankers was 67 feet and the trunk diameter at the existing or predicted trunk canker was 10 inches. It is estimated these cankers will encircle trunk in 17 years and cause top of tree to flag in 22 years. Certain of the mature trees in the stands examined are already top-flagged and others may take as long as 40 years to top-flag. Eleven miles of survey line were run during the 2 months a six-man crew worked in the three drainages on the St. Joe National Forest.

Work in the development of rust resistant western white pine by Bingham included (1) locating new trees as selections of apparent rust resistance; (2) outplanting grafts of resistant selections in resistant test plots; (3) controlled pollinations among resistant tree selections; (4) collecting, extracting, cleaning, and counting seed of 1950 controlled pollinations; (5) initiating tests on rust resistance of  $F_1$  progeny; and (6) preparing an article for publication on tree-breeding activities in the development of rust resistant western white pine.

Seven additional rust resistant western white pine trees were found this year on three different old blister rust infection centers in north Idaho. This brings the total of apparent rust resistant trees to 66, of which 56 are cankerless and 10 trees have 1 or 2 cankers apiece. Grafts of resistant selections were outplanted on  $4\frac{1}{2}$ -acre areas in five resistant test plots located in northeastern Washington, northwestern Montana, and northern Idaho. Each  $4\frac{1}{2}$ -acre outplanting contains 216 grafts at a spacing of 30 x 30 feet. Controlled pollinations among resistant trees involved 33 new crosses between pairs of resistant western white pines, or between resistant western white pines and other resistant species of white pine. Seed of 1950 controlled pollinations was collected, extracted, cleaned, counted, and divided among cooperators. Seventy-eight of the 85 successful crosses in 1950 gave seed in amounts adequate for testing rust resistance of  $F_1$  progeny.

#### DEVELOPMENT AND IMPROVEMENT OF PHYSICAL, CHEMICAL, AND MECHANICAL METHODS OF RIBES ERADICATION

##### Results of herbicidal tests made in 1950

The development and improvement in methods of ribes eradication for 1950 included tests in broadcast spraying 2,4,5-T applied by truck power sprayer to recent and to older cutover lands, basal stem treatment of mature ribes with an oil solution of 2,4,5-T applied with a knapsack sprayer, and tests of the helicopter for re-spraying ribes and brush with 2,4,5-T a year after initial spray treatment.

Tests in the broadcast spraying of recent and older cutover lands with a conventional truck power sprayer were undertaken to evaluate (1) three types of spray nozzles, (2) ease of handling hose lines equipped with quick-coupling Hansen and Foster fittings, (3) the development of training methods and spraying techniques,

(4) the effectiveness of different concentrations of 2,4,5-T in relation to dosages of aqueous spray solution applied per acre, (5) the effect of broadcast spraying on the ecology of ribes and white pine on recent and older cutover lands, and (6) how and when to respray cutover lands. Methods employed in establishing these tests and tables summarizing field records are presented on pages 110 to 114 of the Northwestern Region's Annual Report for 1950.

During the 1951 field season the effectiveness of the different concentrations of 2,4,5-T on seedling ribes and mature bushes was determined by strip checking 20 percent of each plot area. The results of this check are given in table 1 along with other pertinent information obtained from the tests. For the broadcast spraying of seedling ribes on recent cutover lands at least 1,500 p. p. m. acid equivalent (a.e.) of 2,4,5-T is required to obtain a highly satisfactory kill of *R. viscosissimum* and *R. lacustre* seedlings. If the ribes population is largely composed of *R. viscosissimum* 1,500 p. p. m. a.e. of 2,4,5-T is adequate strength of chemical providing a volume of around 200 gallons of spray solution is applied uniformly to an acre. If the ribes population contains many *R. lacustre* seedlings, the concentration of 2,4,5-T should be raised to 2,000 p. p. m. but never higher for initial spray treatment. All of the resprouting seedling bushes observed in the 1,500 and 2,000 p. p. m. series were large bushes which had not received proper spray treatment. Spraymen had either failed to thoroughly drench root-crowns or to wet the tips of all growing shoots. Inadequate drench about the root-crowns of some seedlings was attributed to coverage of the base of the bush by large strips of cedar bark left from a cedar pole operation. The Pecan Gun nozzle fitted with a No. 4 or 5 disc is recommended for broadcast spraying recent cutover lands. Of the three types tested, the use of this nozzle resulted in the smallest man-days per acre charge for spraying. A disadvantage of the Pecan Gun is that it does not permit good control in applying spray solution selectively to ribes for avoiding the treatment of small white pine. If it is important to prevent much damage to white pine (which is most apt to occur from spraying before midseason), the Bean "Majestic" nozzle should be used as it permits good control in applying spray solution selectively to ribes and ribes sites.

For broadcast spraying mature ribes on cutover lands the effectiveness of the four concentrations of 2,4,5-T on *R. viscosissimum* and *R. lacustre* did not vary too greatly. Cost of chemical is an important factor in initial spraying and must be carefully considered in respect to effectiveness of kill. The 1,000 p. p. m. concentration of 2,4,5-T was adequate to open the area for respray treatment but left alive more ribes than could be economically resprayed with knapsack sprayers. A favorable condition for respray at low costs resulted from the use of 2,000 p. p. m. of 2,4,5-T. The advantage of the 2,000 p. p. m. over the 1,000 p. p. m. series was that live ribes were fewer, larger, and more scattered. In the 1,000 p. p. m. series, live ribes occurred more in patches and included bushes of all sizes above 1 foot in height growth. Results of the 3,000 and 4,000 p. p. m. concentrations of 2,4,5-T differed from those of the 2,000 p. p. m. series only by a small increase in the number of bushes killed at a third to a half again the costs of chemical. These higher concentrations are not recommended because of their increased costs and because their effectiveness in bush kill is not significantly greater than the kill resulting from applying 2,000 p. p. m. of 2,4,5-T. The effectiveness of kill based upon nozzle-type was about the same for the three nozzles tested, but on the basis of spraying

TABLE 1

RESULTS OF BROADCAST SPRAYING RECENT AND OLDER CUTOVER LANDS WITH DIFFERENT CONCENTRATIONS OF 2,4,5-T AQUEOUS SOLUTION APPLIED BY TRUCK POWER SPRAYER EQUIPPED WITH THREE TYPES OF SPRAY NOZZLES

Plot No.	Type of Nozzle	Chemical 2,4,5-T p. p. m. (a.e.)	Gallons Spray Per Acre	Man-Days Per Acre 3-Man Crew	Total Ribes Per Acre	Percent Bushes Killed
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## SEEDLING BUSHES

1	Bean	500	270	2.10	1,575	62.5
2	Hudson	500	155	2.39	2,190	66.0
3	Pecan #6	500	317	1.90	1,460	64.7
4	Hudson	1,000	170	2.68	1,975	81.5
5	Bean	1,000	285	1.93	2,690	77.1
6	Pecan #6	1,000	387	2.00	1,580	79.7
7	Hudson	1,500	222	2.10	1,515	97.4
8	Bean	1,500	362	2.30	1,360	98.2
9	Pecan #6	1,500	252	1.57	1,135	97.8
10	Pecan #6	2,000	302	1.44	1,905	99.5
11	Bean	2,000	295	2.33	1,920	99.7
12	Hudson	2,000	290	2.75	1,330	99.6

## MATURE BUSHES

1	Hudson	1,000	275	2.91	1,525	74.8
2	Bean	1,000	280	2.44	2,620	79.2
3	Pecan #5	1,000	320	1.72	2,185	80.3
4	Pecan #6	1,000	405	1.72	3,375	78.7
5	Hudson	2,000	265	2.75	1,820	86.3
6	Bean	2,000	390	2.63	3,430	84.4
7	Pecan #5	2,000	420	1.79	2,280	89.7
8	Pecan #6	2,000	360	1.63	2,535	92.3
9	Hudson	3,000	300	3.03	1,625	88.3
10	Bean	3,000	320	2.25	1,990	85.7
11	Pecan #5	3,000	285	1.50	1,440	88.9
12	Pecan #4	3,000	295	1.66	3,190	90.1
13	Hudson	4,000	215	1.91	1,710	95.0
14	Bean	4,000	205	1.79	1,540	94.8
15	Pecan #5	4,000	205	1.35	1,495	95.3
16	Pecan #4	4,000	210	1.38	1,640	91.5



time, fewer man-days per acre were required in broadcast spraying with the Pecan Gun. This gun fitted with a No. 5 or 4 disc is recommended for broadcast spraying mature ribes. The importance of drenching root-crowns and thoroughly wetting tips of all growing shoots was more apparent in broadcast spraying mature ribes than in treating seedling ribes. Whenever a sprayman failed to treat effectively (which is difficult in initial spray work in large populations of ribes), a bush either resprouted from its crown or continued to develop because of failure to wet tips of all growing shoots.

The effect of broadcast spraying on the ecology of ribes and white pine and determining how and when to respray recent and older cutover lands are problems under investigation. Respray tests were established during 1951 and will be replicated again next summer to determine whether respray should follow 1 or 2 years after initial spray treatment. Observations are being made for new ribes seedlings and the occurrence and growth of white pine on both the recent and older cutover areas. Specific recommendations for spraying, based on data from this and other studies, will be prepared separately for the control operations.

The results of tests in basal stem treatment of mature ribes are shown in table 2. For this type of treatment spray solution is applied to the lower foot of stems and to the root crown. Tests included five plots with concentrations of 2,4,5-T of 1,  $2\frac{1}{2}$ , 5, 10, and 20 percent in stove oil diluent. A 100 percent kill was reached with a 5 percent concentration of 2,4,5-T. Basal stem treatment provides a quick method of chemical application that can be employed for late season work after bushes are defoliated, early in the spring before bushes are fully foliated, or it can be used for treating troublesome patches of large ribes during the regular growing season.

TABLE 2

RESULTS OF BASAL STEM TREATMENT COMPARING FIVE CONCENTRATIONS  
OF 2,4,5-T DILUTED IN STOVE OIL  
REED'S CREEK, CLEARWATER FOREST

Plot No.	2,4,5-T Percent <sup>1/</sup>	Diluent		Total Number of Ribes Resprouting	Percent Bushes Killed
		Stove Oil Gallons	Ribes		
1	20	1	63	0	100
2	10	1	44	0	100
3	5	2	67	0	100
4	$2\frac{1}{2}$	2	124	2	98.4
5	1	2	96	1	99.0

<sup>1/</sup>Approximate acid equivalent by weight.  
Treatments made August 31, 1950.

The results of respraying four 2-acre plots by helicopter on Windfall Peak, Coeur d'Alene National Forest, 1 year after initial spray treatment are shown in table 3. All four plots on respray received the equivalent of 1 pound of

2,4,5-T acid per acre in an aqueous solution containing 1 percent oil emulsion. On Initial spray treatment, plot 11 received a dosage rate of 5 gallons of spray solution per acre where the others got twice this amount. No seedlings were found on any of the plots after respray. The effectiveness of respray on mature ribes varied with species of ribes. On plots 1 and 4, R. lacustre was the predominate species. Respray did not materially increase the effectiveness of kill over results from initial spray treatment. Where ribes population was mainly R. viscosissimum, plots 8 and 11, the result was a fairly good increase in effectiveness of kill by respray over kill from initial spray treatment. The most significant increase came on plot 11 which was the only one getting 5 gallons of spray solution per acre on initial spray treatment. On respray, this plot received twice the dosage per acre of the initial spray treatment.

Data in table 3 are not extensive enough to provide a basis for recommendations on respraying of mature ribes. Further experience is necessary from large-scale field tests in respray, some of which was done by helicopter this past season. Respray is recommended for areas of seedling ribes where initial treatment is not too effective because of screening by other vegetation. Areas of seedling ribes should be resprayed before other vegetation develops to the point where it again screens ribes from spray applied by helicopter. Areas of seedling ribes should be resprayed after midsummer of the first year following initial spray treatment or in early season of the second year before the development of herbaceous growth.

TABLE 3

RESULTS OF RESPRAY IN APPLYING 2,4,5-T BY HELICOPTER  
1 YEAR AFTER INITIAL SPRAY TREATMENT ON  
WINDFALL PEAK, COEUR D'ALENE NATIONAL FOREST  
DATE OF TREATMENT: JULY 10, 1951

Plot <sup>1/</sup> No.	Solution Per Acre Respray Gallons	Percent of Bushes Killed			
		Seedling Ribes		Mature Ribes	
		Initial Spray	Respray	Initial Spray	Respray
4	5	100	100	75	79
8	5	99	100	78	87
1	10	99	100	72	75
11	10	58	100	38	84

<sup>1/</sup>Plot No. 11 received 5 gallons per acre on initial spray treatment; other plots received 10 gallons of spray solution per acre.

#### Herbicidal tests in 1951

Most of the tests made in 1951 were of adjuvants to increase wetting and penetration of 2,4,5-T. In addition, four new formulations of 2,4,5-T were tested. These were supplied in experimental quantities by the American Chemical Paint Company. Data for 1951 tests are given in table 4. Spray solution was applied to ribes with knapsack sprayers. Plots were established to include both R. viscosissimum and R. lacustre on the four north Idaho forests. Tests were

replicated throughout the growing season but not always on the same forest. Size of plot varied from 1 milacre to 1/20 of an acre. For comparing the effectiveness of different concentrations of 2,4,5-T, the plots were either 1 milacre or 4 mil-acres in size. The larger size plots were established for the tests with low concentrations of 2,4,5-T primarily to have a sufficient number of resprouts for later tests in respray. Spray solution was applied uniformly to each plot drenching root crowns and wetting stems, foliage, and tips of all growing shoots. The only noticeable difference among the adjuvants was that some caused systemic damage of ribs from 2,4,5-T quicker than others. Whether or not any of the new adjuvants will increase the effectiveness of 2,4,5-T over the 1 percent oil emulsion now in general use will not be known until the plots have been checked early next spring.

Not shown in table 4 is a series of comparable tests in applying 2,4,5-T to large ribs plants, half being scarified at the crown and the others left as checks. Established in Reed's Creek, Clearwater Forest, this study was made for the purpose of learning whether the effectiveness of kill of large bushes and resistant species could be increased through scarification of the root crowns to facilitate penetration of 2,4,5-T. A total of 24 bushes was treated including both species *R. viscosissimum* and *R. lacustre*. Crowns of 12 plants were scarified with a knife prior to spraying each bush with a trombone pump sprayer. Spray solution was applied identically to checks and scarified bushes by drenching crowns and wetting stems, foliage, and tips of all growing shoots.

A number of chemicals possessing fungicidal or herbicidal properties were tested on infected white pine for canker elimination. Initial work on this project was started in 1949, with tests in screening a few chemicals for canker elimination and in the development of methods in applying chemical solution to infected white pine. The results of these 1949 tests and a small amount of work in 1950 were encouraging enough to warrant enlarging the scope of these studies in 1951. Chemicals tested on infected white pine for canker elimination in 1951 are shown in table 5.

Tests were made on infected white pine in the Solitaire Creek Plantation, Coeur d'Alene National Forest. Two or more concentrations of each chemical in 2 gallons of aqueous solution were applied to five infected trees. The aqueous solution was applied as a foliage spray wetting the entire tree from top to ground line with a knapsack sprayer. The 2 gallons of spray solution were distributed uniformly among the five trees. Trees selected for treatment included two or more with trunk cankers and all five with three or more limb infections representing all stages of canker development. Data recorded for each tree included type and stage of cankers, location of infected limb or trunk canker on the tree by compass direction, and whorl number, and height and vigor of tree. For each tree data sheets were used to keep records of each canker separate.

Most of the tests shown in table 5 were made of acti-dione alone or in combination with an ester of 2,4,5-trichlorophenoxyacetic acid. Both of these chemicals in the previous screening tests had caused a rapid acceleration of the flagging or dying of infected branches and in some cases killed the canker. The two chemicals in combination induced these effects on infected white pine better than either chemical alone. In screening tests, 10 p. p. m. of acti-dione was employed with 1,000 p. p. m. of the ester of 2,4,5-T in aqueous solution without a wetting agent.



TABLE 4

NEW FORMULATIONS OF 2,4,5-T APPLIED BY KNAPSACK SPRAYER TO RIBES IN 1951

Plot Location	Trade Name or Code	Concentration	Adjuvants	Dates of	Plots
<u>Forest and Drainage</u>	<u>Number of 2,4,5-T Used</u>	<u>p. p. m. (a.e.)</u>	<u>Percent by Volume</u>	<u>Appli- cation</u>	<u>No.</u>
Coeur d'Alene				7/27,8/8,	
Cascade Creek		1000, 2000	none	9/5	6
Clearwater		300, 500, 600,		6/13, 7/9,	
Reed's Creek		1000, 2000,	Oil emulsion-.1	7/10, 7/17	
St. Joe		3000		7/27, 8/4,	
St. Maries Riv.				8/8, 8/14	
Kaniksu				9/5	26
LaClere Creek		300, 600,	Tween 20	7/9, 7/17,	
Diamond Creek		1000, 2000	.1 & .5	7/27, 8/8,	
Pass Creek Pass				9/5	14
Granite Creek		300, 600	Multi Film L	7/9, 7/17,	
	Stantox T-45	1000, 2000	.1 & .5	7/27, 8/8,	
	and			9/5	14
	Weedone 2,4,5-T	300, 600,	Triton B-1956	7/9, 7/17,	
		1000, 2000	.1 & .5	7/27, 8/8,	
				9/5	12
		300, 600,	Triton X-45	7/9, 7/17,	
		1000, 2000	.1 & .5	7/27, 8/8,	
				9/5	12
		300, 600,	Triton X-100	7/9, 7/17,	
		1000, 2000	.1 & .5	7/27, 8/8,	
				9/5	8
		300, 600,	Oil emulsion-.01	7/10, 7/17,	
		1000, 2000	Propylene glycol	7/30, 8/8,	
			.1 & .5	9/5	20
		500, 1000,		7/9, 7/17,	
	ACP - 965	2000	Oil emulsion-.1	7/27, 8/4,	
				8/8, 8/14,	
				9/5	16
		500, 1000,		7/9, 7/17,	
	ACP - 908	2000	Oil emulsion-.1	7/27, 8/4,	
				8/8, 8/14,	
				9/5	16
Coeur d'Alene			none	7/30	2
St. Joe	ACP - 904	1000, 2000		7/30, 8/4,	
Kaniksu			Oil emulsion-.1	8/8, 8/14,	
				9/5	10
Clearwater	ACP - 816	500, 1000,			
	Amine	2000	Oil emulsion-.1	7/18	3

This season acti-dione was tested over a range of five concentrations with and without an adjuvant, then at two concentrations adding various penetrants and combining it with various formulations of 2,4,5-T. To determine whether or not the two chemicals are translocated in lethal amounts to produce flagging or dying of infected limbs, a total of 20 trees was sprayed after each infected limb had been wrapped with paper to protect it from directly receiving spray solution. This was accomplished by first wrapping each infected limb with two or three thicknesses of newspaper, then covering with wax paper. After protecting all infected limbs against spray by paper wrappings, trees were sprayed as described for other tests. Only trees with limb cankers were used for this study of the translocation of chemicals to avoid solution entering the circulatory system of trees through a fruiting canker on the trunk. The point in question is whether the toxicant would be effective if applied by helicopter where screening of infected limbs would necessitate the translocation of chemical from parts of tree receiving spray solution. In addition to tests with acti-dione and 2,4,5-T, a number of other chemicals are under investigation. The results of tests in table 5 will be determined and reported in 1952.

TABLE 5

RECORD OF CHEMICALS TESTED ON INFECTED WHITE PINE FOR CANKER ELIMINATION  
SOLITAIRE CREEK, COEUR D'ALENE NATIONAL FOREST

<u>Name of Chemical</u>	<u>Concentration<sup>1/</sup></u> <u>p. p. m.</u>	<u>Adjuvants</u> <u>Percent</u> <u>by Volume</u>	<u>Dates of</u> <u>Appli-</u> <u>cation</u>
Zinc ethylene bisdithiocarbamate	500, 1000, 2000, 4000	Tween 20 - .1	6/14
F. 1112 (zinc salt 2,4,5-trichloro-phenol)	500, 1000, 2000, 4000	Tween 20 - .1	6/15
Dowicide-B (sodium trichlorophenate)	500, 1000, 2000, 4000	Tween 20 - .1	6/18
Methasan (zinc dimethyl bisdithiocarbamate)	500, 1000, 2000, 4000	Tween 20 - .1	6/21
F-1000 (zinc salt 2,4,5-trichloro-phenol)	500, 1000, 2000, 4000	Tween 20 - .1	6/22
Dowicide-G (sodium pentachlorophenate)	500, 1000, 2000, 4000	Tween 20 - .1	6/22
DN-111 (dinitro-o-cyclo-hexylphenol)	500, 1000, 2000	Tween 20 - .1	6/23
Bioquin-1 (copper 8-quinolinolate)	500, 1000, 2000	Tween 20 - .1	6/23
Dichloro diphenyl thiophene (powder)	500, 1000, 2000	Tween 20 - .1	6/25
4,cyclohexyl-2,6-dinitrophenol	500, 1000, 2000	Tween 20 - .1	6/25
Acti-dione	5,10,20,40, 80	Tween 20 - .1	6/27,8/21
Acti-dione	5,10,20,40, 80	None	6/27,8/21

TABLE 5 (contd.)

RECORD OF CHEMICALS TESTED ON INFECTED WHITE PINE FOR CANKER ELIMINATION  
SOLITAIRE CREEK, COEUR D'ALENE NATIONAL FOREST

<u>Name of Chemical</u>	<u>Concentration<sup>1/</sup> p. p. m.</u>	<u>Adjuvants Percent by Volume</u>	<u>Dates of Appli- cation</u>
Acti-dione	10, 20	Triton X-45, .1	6/27, 8/21
Acti-dione	10, 20	Triton B-1956 .1	6/27, 8/21
Acti-dione	10, 20	Multi Film L .1	6/27, 8/21
Acti-dione	10, 20	Oil emulsion-.1 Propylene glycol .1 & .5	6/28, 8/21
Acti-dione	10, 20		
Weedone 2,4,5-T	1,000	Tween 20 - .1	6/28, 8/21
Acti-dione	10, 20		
Weedone 2,4,5-T	1,000	Multi Film L-.1	6/28, 8/21
Acti-dione	10, 20		
Weedone 2,4,5-T	1,000	Oil emulsion-.1	6/28, 8/22
Acti-dione (Infected limbs protected from spray by paper wrappings)	10, 20	None	7/5
Acti-dione (Infected limbs protected from spray by paper wrappings)	10, 20	Tween 20 - .1	7/5, 8/23
DN-289 (dichloro diphenyl thiophene, commercial liquid)	500, 1000, 2000, 4000	Tween 20 - .1	6/29, 8/23
Dithane D-14 (disodium ethylene bis- dithiocarbamate)	500, 1000, 2000, 4000	Tween 20 - .1	6/29
Weedone 2,4,5-T	1,000	Oil emulsion-.1	8/22
ACP-904 (2,4,5-T)	1,000	Oil emulsion-.1	8/22
Acti-dione	10, 20		
ACP-904 (2,4,5-T)	1,000	Oil emulsion-.1	8/22
ACP-965 (2,4,5-T)	1,000	Oil emulsion-.1	8/22
Acti-dione	10, 20		
ACP-965 (2,4,5-T)	1,000	Oil emulsion-.1	8/22
ACP-908 (2,4,5-T)	1,000	Oil emulsion-.1	8/22
Acti-dione	10, 20		
ACP-908 (2,4,5-T)	1,000	Oil emulsion-.1	8/23
Acti-dione	10, 20		
Weedone 2,4,5-T	1,000	Oil emulsion-.1	8/23
(Infected limbs protected from spray by paper wrappings)			

<sup>1/</sup>Two gallons of each chemical concentration was applied to five infected trees

## DEVELOPMENT AND IMPROVEMENT OF SPRAY EQUIPMENT

### I. Current activities

The mist blower sprayer, first used in 1950, was refitted with a water-cooled power plant of 25 hp. An intake hose centered in the gear driven turntable was installed.

Three new patterns of air nozzles were designed for the blower. Fabrication was done by a local sheet metal plant. Whirljet hydraulic nozzles were fitted in the throats of the air nozzles at the Clarkia shop.

The best performer of these was a revamped 12-inch diameter round nozzle. A convex ring was added extending its original length. A funnel-shaped deflector was then centered in the nozzle orifice. Liquid spray was introduced from six Whirljet nozzles turned to discharge with the air stream.

Another excellent air nozzle designed and fabricated was a three-outlet pattern. The center segment is fixed in place, but the two outside throats are adjustable so that any angle up to a full quarter turn can be attained. Spray is introduced through two Whirljets centered in each outlet. Superior spray coverage is attained with this nozzle.

Vanes were installed in a fishtail nozzle to try and improve its scattered spray pattern. No improvement resulted from the change.

A large capacity sprayer was assembled on a 6x6 all wheel drive truck chassis. An extra 300-gallon tank was installed as a part of the sprayer. Performance was excellent on steep cutover skid roads. More of these units are planned for the future.

Plans were developed which resulted in assembling high pressure hose and quick-connector couplings to outfit all spray crews. These units, employed by both the Bureau of Entomology and Plant Quarantine and the U. S. Forest Service crews, helped to attain uniformity in spraying practices and resulted in a savings of spraying time.

A plan was formulated, necessary materials secured, and installations were made on six safety glass windows in each of two 1951 Chevrolet sedan delivery trucks. These two Government-owned cars are used daily during the work season on high mountain roads where extra visibility is required. Installations were made in the Blister Rust Control shop at Clarkia, Idaho.

Work on improving portable power sprayer, which included the elimination of mixing vats and sprayer tenders, was started. Difficulty has been experienced in securing a satisfactory chemical injector that will operate automatically. This activity will be carried over into 1952.

Maintenance and reconditioning of machines used in blister rust control has reduced in work load because of many replacements by newer, more serviceable equipment. The past history of our activity has demonstrated the necessity of providing stronger machinery to work with.



## II. New work contemplated for 1952

Speed sprayer conversions for broadcast spraying of forest lands for ribes control. Use all wheel drive trucks or track-laying tractors for mounting these sprayers.

Transfer Models 30 and 35 heavy duty sprayers to newer, more powerful trucks, and install extra tanks to increase their gross spray loads.

Continue experiments with injectors to introduce spray concentrates into small portable sprayers.

Develop a method of using horse- or mule-mounted spray tanks and sprayers for off-the-road ribes control.

### RIBES ECOLOGY IN RELATION TO CONTROL WORK AND WHITE PINE MANAGEMENT

#### Longevity of stored ribes seed

A number of soil disturbance plots were established in 1951 to determine (1) what effect 2,4,5-T acid spray has on the viability of stored ribes seed, (2) the occurrence of ribes seedlings in relation to years after clear-cutting and broadcast burning, and (3) the quantity of stored ribes seed viable following second cutting 15 to 20 years after first partial cutting.

To determine the effect of 2,4,5-T spray on stored ribes seed, soil disturbance plots were established in the Clearwater Forest and Kaniksu National Forest. In the Clearwater Forest, soil disturbance plots were located on both the recent and older cutover areas broadcast sprayed in 1950. Four 1-milacre plots were established on an area sprayed with each concentration of 2,4,5-T. On the recent cutover area of seedling ribes, four 1-milacre plots were placed on an area sprayed with 500 p. p. m. of 2,4,5-T acid, four plots on the 1,000 p. p. m. area, four on the 1,500, and four on the 2,000 p. p. m. sprayed area. For a check, four disturbance plots were established on typical cutover area adjacent to the broadcast sprayed area. Corners of the 1-milacre plots were staked, then with a Pulaski tool and rake, all vegetation and the entire layer of organic mantle were removed down to mineral soil. The organic mantle was raked back and forth over each plot to remove all ribes seed before taking the material off the 1-milacre plot. Identical plots were established on the older cutover area where concentrations of 2,4,5-T were 1000, 2000, 3000, and 4000 p. p. m. In the Kaniksu National Forest, 18 soil disturbance plots were established on sprayed and 18 on unsprayed hand eradicated area. These were located in a broadcast burn on Diamond Peak near the top of the ridge where ribes had regenerated in large numbers after burning. Surfaces of these plots were similarly prepared to those established in the Clearwater Forest.

To obtain further information on the length of time that stored ribes seed will remain viable after clear-cutting and broadcast burning, twenty-four 1-milacre soil disturbance plots were placed on the Lamb Creek and Bath Creek burns. Twelve went on the Lamb Creek side and twelve in the Bath Creek drainage. These plots were located along the top of a main ridge where large ribes populations had become established following burning. No ribes plants were currently found in the vicinity of any of the soil disturbance plots.

To determine how much of the stored ribes seed is viable at the time of second cutting, which will normally come 15 to 20 years after first cutting, twelve 1-milacre plots were established in the Bear Paw Partial Cutting and three plots in the Hannah Area on the Kaniksu National Forest. On the Hannah Area, the three soil disturbance plots were placed on three soil surfaces at the half shade station previously employed to study the relation of light and moisture to the germination and development of ribes and white pine. This was done to assure an adequate supply of ribes seed for observation as the Hannah Area in general contains few soil stored seed. Additional soil disturbance plots will be established in the region as more second cutting is undertaken on areas scheduled for management by partial cutting methods.

#### Effect of cutting practices on ribes ecology

The results of studies in coordinating timber management practices with blister rust control have been embodied into a manuscript for publication as a Departmental Circular entitled "Aiding Blister Rust Control by Silvicultural Measures in the Western White Pine Type." This manuscript was prepared in cooperation with Charles A. Wellner, Northern Rocky Mountain Forest and Range Experiment Station. Contents will include a separate section on ribes ecology, blister rust infection of ribes and pine, blister rust in relation to timber management, and a discussion of the problems of unit management in the western white pine type.



## BLISTER RUST DAMAGE SURVEYS EXTENDED TO MATURE WESTERN WHITE PINE STANDS

Young mature western white pine stands bordering the upper St. Joe River, St. Joe National Forest, northern Idaho, have been set up in management plans for long-term partial cuttings. For certain of the more remote drainages of this area management plans call for partial cuttings extending almost 60 years into the future. Any forest influence which reduces the amount of mature timber available, or necessitates shortening the length of time in the complete cutting cycle, is of utmost importance. Consequently, epidemic development of blister rust in these drainages would be of immediate concern.

In the fall of 1950, several parties of foresters and pathologists investigated reports of serious rust damage occurring in Bird Creek, a major drainage along the St. Joe River above Avery, Idaho. They saw an alarming amount of rust damage apparent in tops of mature white pines along the creek bottom. Examination of a few felled trees showed upward of a thousand cankers in certain trees, with as many as 10 to 15 cankers already in trunk or about to enter trunk. Opinions varied on the amount of rust damage in trees more remote from the heavily infected creek bottom, and on the stand treatment indicated by these preliminary investigations. All investigators were in agreement that:

- (1) A carefully planned survey of the rust damage was needed and should begin immediately.
- (2) Such a survey should be based upon comprehensive data of growth rates of trunk cankers, time of top-flagging of trunk-cankered trees, and time of death of top-flagged trees.
- (3) To prevent further loss of valuable trees through cutting for rust damage examinations, high-climbing examination techniques should be used.
- (4) Young mature stands of western white pine in other large drainages along the upper St. Joe River should be included in the survey.

Survey work got under way in July 1951. Bingham developed survey methods and trained high-climbing crews, and the St. Joe National Forest supplied crew members (R. Cox, L. MacDonald, H. Hunt, R. Tower, and R. Steward, original crew members), crew leader (F. Gerlach), and supervisor (R. Thaanum). After a 2 weeks' training period at Blister Rust Control Headquarters, Clarkia, Idaho, and in the mature stand on Bird Creek, the survey progressed over Bird Creek and two other major drainages, Gold Creek and Simmons Creek, both more remote in accessibility and intended time of cutting. A brief report on methods employed and results obtained follows. The details of survey methods and results will be included in a serial report to be issued soon.

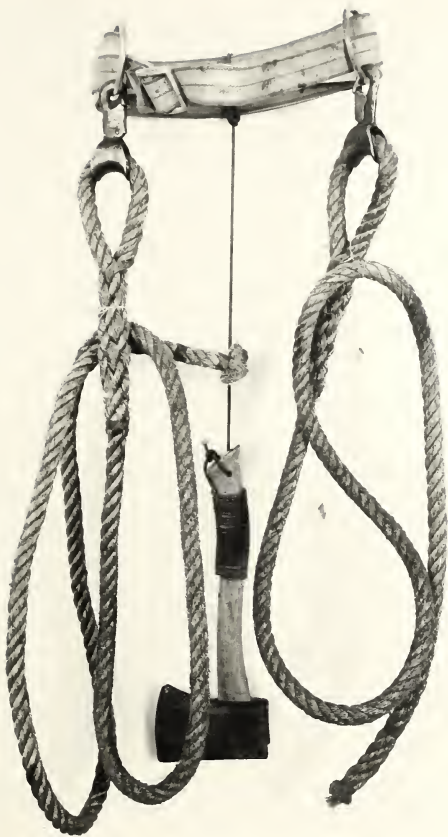
### Methods:

High-climbing gear. The only specialized gear required for climbing the large trees examined (average age, 111 years; height, 122 feet; d.b.h., 19 inches) was two wire-core rope safety lanyards, substituted for the conventional leather safety strap. All other climbing gear used was regular telephone lineman's climbing equipment. The special wire center lanyards had three advantages, being longer, safer, and more easily let out or taken in than the conventional strap when the strap buckle is on the back side of a large diameter trunk. Two lanyards were used in order that the climber might attach the second above a large limb or other large trunk obstruction which he did not want to cut off before detaching the first from beneath the obstruction. The special lanyards and other conventional gear employed are shown in Figure 1.

The Survey Method. As high-climbing operations are slow and costly, survey intensity was held to a minimum. Trees were examined along survey line systematically spaced at 1-mile intervals. Survey lines were located so that they crossed both major and minor drainages, not so that they went directly up a drainage or ridge, because of the belief that rust damage was correlated with proximity to stream. This should have eliminated sample lines overweighted with either stream bottom or ridge type samples. Mature white pines were examined at 2-chain intervals along the survey lines until enough data had been collected to analyze for survey intensity. After completion of three survey lines on Bird Creek and parts of two lines in Gold Creek, it was found that the interval between trees could be raised to 4 chains, or climbing work reduced one-half without materially changing means for rust damage, age of top-flagging, or other variables.

Using the survey intensity outlined above, it was found that in two of the drainages surveyed (Gold and Simmons Creeks) the degree of rust damage to the mature trees was both high and uniformly distributed. Additional or fill-in survey lines will probably not have to be run in these two drainages. In Bird Creek, however, rust damage was high on two of the original survey lines (74-86 percent), but only moderately high (42 percent) on the third or center survey line which tapped a deep, relatively detached side basin of the main drainage. Here it was necessary to return and run fill-in lines at one-half mile intervals. These have aided in determining the extent of the moderately damaged portion of the stand.

The general procedure in examining a mature tree was as follows: The age and d.b.h. of the designated sample tree were determined by the groundman with an increment borer and diameter tape, while a second crewman (climber) checked his climbing gear and put it on in preparation for climbing. As the climber ascended the lower portion of the bole, the groundman sought a spot level with the tree base and exactly 100 feet from the base, from which he could see a good portion of the tree bole. As the climber continued upward, swamping his way through dead branches with a hand axe, the groundman measured the height of the tree and of the lowest live branches with an Abney level. Once the climber reached live limbs of the lower crown he examined each branch for cankers, excluding that portion of the branch over 2 feet from trunk. He continued examining, swamping, and climbing in this manner until he found a trunk canker or branch canker he estimated would eventually reach the trunk, or until he reached a point where the tree trunk measured less than 6 inches in diameter. Most often the climber reached relatively sound live branches after going above the suppressed portion of the live crown. He then climbed without using the safety lanyard, to eliminate swamping hazards, but tied-in each time he stopped to examine branches. In climbing without the lanyard, both hands were always kept around and behind the trunk. If the climber found either a trunk canker or branch canker estimated capable of reaching trunk, he called its position to the attention of the groundman and relayed the following measurements: If a branch canker: over-all distance to trunk and the branch internode lengths and diameters for internodes included in the over-all distance, diameter of trunk at the point where the canker would enter trunk, and the vigor of the portion of the live-crown below the trunk canker. If already a trunk canker: diameter of the trunk at the point of canker entry, inches of trunk circumference yet to be encircled by the advancing trunk canker, and vigor of the live-crown below the canker. Meanwhile the groundman determined the height of the canker with an Abney level. If lethal cankers were not found, the tree was recorded harmlessly infected or healthy. It was soon found that the climber required from one-half hour to more than an hour to ascend, examine, and descend the mature pines. The groundman had more than adequate



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Figure 1. Lightweight web safety belt with 11-foot wire-center safety lanyard (left) and 8-foot safety lanyard (right) attached. Conventional hand axe hung from rear of belt is used in swamping out dead limbs while ascending tree.





time to make and record all measurements, then interpret them directly on the field data forms.

Basic data for interpreting tree and canker measurements were obtained from several sources. Data on annual lateral (encircling) growth for 105 cases of cankers on trunks ranging from  $1\frac{1}{2}$  to  $9\frac{1}{4}$  inches in diameter were supplied by Professor A. W. Slipp of the University of Idaho. These data, combined with those already in hand on determining lethal branch cankers (cf. pages 115-117, 1950 Annual Report), and a small amount of preliminary data on length of time between trunk canker encirclement and top-flagging and on annual increase in trunk diameter at various tree crown levels, enabled us to predict the number of years which it would take a given trunk canker, or lethal branch canker, to encircle, then cause top-flagging of a mature tree. These data were summarized for field use in a chart carried by the two-man survey crew (see Figure 2). An example of how predictions were made follows. The climber in a dominant tree has found a branch canker now 6 inches from trunk on a branch internode  $3\frac{3}{4}$  inch in diameter, diameter of the trunk at the base of this branch is 13 inches. The groundman refers to Part A. of his chart where he finds that the average branch canker on a  $3\frac{3}{4}$  inch diameter branch will cross a 9 inch unsupported internode, and that the annual growth rate for cankers on  $3\frac{3}{4}$  inch diameter branches is about 2 inches per year. He classifies the branch canker as lethal, and notes that it will require 3 years, at the rate of 2 inches per year, for it to cross the remaining 6 inches of branch now intervening between inner canker margin and trunk. The groundman next refers to Part B. of his chart and determines that the circumference corresponding to a 13 inch trunk diameter is 40 inches. Reference to Part C of his chart shows him that on 13 inch diameter trunks ( $9.6''$  & Class), 39 inches (or almost 40 inches) of circumference would be encircled by the average trunk canker in a matter of 13 years, 40 inches in a slightly longer period. Thus, encirclement of the trunk should occur about 16 years hence, i.e., 3 years for canker to reach trunk plus 13 years for it to encircle trunk. During this time diameter of the trunk would have increased about 1 inch, circumference about 3 inches (Part D of chart), and time till encirclement to about 14 years. The estimator then adds on a flat increase of 5 years, Part E, to include the additional time required for the tree to top-flag, once encircled by the canker making a total of 19 years till time of top-flagging. Field predictions stopped here.

Altogether, a comprehensive picture of conditions in each tree was obtained. Data recorded included tree height, diameter, and age; whether the tree was healthy, harmlessly infected, or lethally infected; if lethally infected, whether by a branch or trunk canker (accompanied by appropriate measurements on branch diameter and internodal lengths in infected branch, and/or trunk circumference yet to be encircled by the trunk canker); estimated number of years until trunk encirclement and top-flagging will occur; feet of live-crown above and below the existing or predicted trunk canker; and present vigor of the live-crown below the trunk canker.

Initially, data were taken on not only the lowest lethal infection, but also on any more advanced lethal infection, when present, higher up the trunk. It was found that in about 65 percent of the cases, lowest lethal cankers were also the most advanced lethal cankers, so the practice of examining beyond the lowest lethal canker was discontinued.

Survey costs were high, largely because most of the survey work was carried on in remote drainages where walking time was up to 4 hours per day and where crews were batching or camping out. Altogether, 11 miles of survey line were run and 268 mature trees were climbed and examined during the 2 months the 6-man crew worked. Removing training time, fire time, and nonwork days, this is an average of about  $1\frac{1}{2}$  trees examined per effective man-day. The number examined daily by the entire crew varied between 4 and 12 trees, depending on remoteness of the survey line being run. It is believed, however, that the survey methods used were faster than if the trees had been felled and examined. Furthermore, the saving in timber due to climbing rather than felling amounted to between \$80 and \$120 or more per day. Although survey costs were high, the importance of the findings to white pine timber managers, in indicating the need for immediate action to salvage imminent losses, justifies even a greater cost.

### Results and Discussion:

Survey results for the three drainages sampled are included in Table 1. The average mature tree examined was about 111 years old, 122 feet high, and 19 inches in diameter at breast height. Of the 268 trees sampled, about 64 percent was already trunk cankered or had lethal branch cankers predicted capable of reaching trunk. The height of existing or predicted trunk cankers on the average lethally infected tree was about 67 feet above ground, ranging from 15 feet to 113 feet above ground. Neither the high degree of infection and damage, nor the relative height of the cankers is particularly surprising, considered in the light of early findings on development of blister rust in mature eastern white pine, and later studies on rust damage in western white pine. Posey and Ford, Martin, and others had pointed out serious rust damage occurring in the tops of large eastern white pines, beginning as early as 1924 in Maine. Lachmund, Buchanan, Swanson, Bingham, and others had pointed out serious damage occurring in western white pines 75 to 160 feet in height, beginning as early as 1934 in British Columbia. The serious damage occurring in unprotected mature stands here reported upon is following a long established pattern.

The average lethally infected mature tree has, or will soon have, a trunk canker about 67 feet up the trunk, where trunk diameter is about 10 inches. This canker will encircle the trunk in about 16 years, and probably cause the entire top of the tree to flag in about 22 years. Certain of the mature trees in the stands examined are already top-flagged, but it is predicted that others may take as long as almost 40 years to top-flag. Once the tree has top-flagged, live-crown measurements show that the upper, most vigorous two-thirds of the live-crown will be the portion lost 20 years hence at time of top-flagging. The remaining one-third of the live-crown, now of only medium or low vigor, will probably be considerably shortened by natural suppression and resulting branch pruning, also less vigorous. Openings in the relatively well-stocked stands will occur due to top-flagging of surrounding white pines, but the crowns of the mixed species in the stand will occupy many of these. The life span of the trees once top-flagged is problematical but information on life of broken topped pines may help to arrive at a fair estimate of this nature.

About one-third of the lethally infected trees just described have yet another more serious trunk canker about 16 feet higher on their trunks, where trunk diameter has decreased to about  $7\frac{1}{2}$  inches. The average of these doubly-damaged



- Figure 2 -

BASIC DATA FOR FIELD USE IN ESTIMATING YEARS TILL TOP-FLAGGING OF LETHALLY INFECTED, MATURE WESTERN WHITE PINES

A. Distinguishing Lethal From Harmless Branch Cankers, Years Required for Lethal Cankers to Reach Trunk:

Diam. Class of Infected Branch (inches)	Length of Unsupported Branch Internode Average Canker Capable of Crossing in Spread Toward Trunk (inches)	Average Annual Growth Along Branch Toward Trunk (inches)
0-1/4	6	1
1/4+-1/2	6	2
1/2+-1	9	2
1+	12	3

B. Conversion, Diameter of Trunk at Point of Canker Entry to Circumference at Point of Canker Entry:

Trunk Diameter (inches)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Corresponding Circumference (inches)	15	19	22	25	28	31	34	37	40	43	46	50	53	56	59	62

C. Years Till Canker Encircles Trunk:

Diam. Class of Trunk at Canker (inches)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4.6-6.5	2 1/2	5	7 1/2	10	12 1/2	15	17 1/2	20	22 1/2	25	27 1/2	30	32 1/2	35	37 1/2	40
6.6-9.5	3	5	8	11	14	16	19	22	25	27	30	33	36	38	41	43
9.6+	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48

Find diameter class of existing or prospective trunk canker in column on left. Then to the right in that diameter class line, select the cumulative encircling growth figure most nearly equal to the circumference obtained in part B., above. Move upward and note the number of years required for encirclement.

D. Time Allowance for Increase in Trunk Circumference During Years Canker is Reaching and/or Encircling Trunk:

If the number of years required for encirclement, part C above, exceeds 10 years, but is less than 30 years, add 3 inches to the circumference obtained in part B. above, for dominant and codominant trees; 1 1/2 inches for intermediate and suppressed trees. Then recalculate number of years till encirclement in part C, above. Double the additions for encirclement periods exceeding 30 years but less than 50 years.

E. Time Between Encirclement and Top-flagging:

Add 5 years to the total time for encirclement obtained in parts A-D, above.



TABLE 1. BLISTER RUST DAMAGE TO MATURE WESTERN WHITE PINE IN BIRD, GOLD, AND SIMMONS CREEKS, ST. JOE NF, 1951

Creek	No. Meas. Average Range Meas.	Age, Years	Height Feet	d.b.h. Inches	Tree Condition		Height Above Ground Feet	Trunk		Est. Years Till Top Flags	Feet		Live-Crown/Canker Relation	
					Healthy or Harm- lessly Infected	Lethally Infected		Inches	Diam.		Above Canker	Below Canker	Total Live- Crown	Vigor Below Canker
					49	72		72	72		72	72	72	72
Bird	No. Meas.	86	119	119			72							
	Average	116	118.5	18.4	40.5%	69.5%	59.7	11.2	20.5	58.6	23.9	82.7	Med-Low	
Gold	No. Meas.	89	120	119	42	78	78	78	78	78	78	78	78	78
	Average	105	123.8	19.3	35.0%	65.0%	71.1	9.7	22.1	49.6	33.9	83.5	Medium	
Simmons	No. Meas.	20	27	27	6	21	21	21	21	21	21	21	21	21
	Average	115	126.4	19.0	22.2%	77.8%	79.3	9.6	23.4	46.9	28.4	75.3	Med-Low	
Grand Totals	No. Meas.	195	266	265	97	171	171	171	171	171	171	171	171	171
	Average	111	121.7	18.9	36.2%	63.8%	67.3	10.3	21.6	53.1	29.0	82.1	Med-Low	
Bird & Gold	No. Meas.	72-196	73-165	12-28			15-113	4-21	7-38	14-125	0-81	34-130	Trunk	
	Averages Range Meas.						83.2	4-13	37.4	12.7	42.3	79.7	Med-High	
							45-118	4-13	0-99	0-27	5-80	34-128		

<sup>1/</sup>Data taken early in survey on three survey lines in Bird Creek and parts of two survey lines in Gold Creek.

A total of 94 trees was examined to determine whether they had more advanced lethal infections above the lowest lethal infections. Thirty-one trees (about 33 percent) had these more advanced infections.



trees will lose about half of their live-crown about 13 years hence, leaving the other medium to high vigor half of the live-crown to support the tree. Probably the death of the entire tree will be hastened only a few years by this progressive top-flagging; certainly very little timber volume will be lost.

Mr. Wellner, Spokane Research Center, Northern Rocky Mountain Forest and Range Experiment Station, has provided the following tabular summary of estimated life expectancy among broken-topped western white pines. The data upon which the table is based include 575 trees, mostly located in fairly dense stands. These data are being increased by inspection of other permanent plot records and the table is subject to revision to include new measurements.

Table 2. Estimated Life Expectancy of White Pine Trees with Broken Tops

<u>Crown Class</u>	<u>Percent of Live-Crown Removed</u>	<u>Estimated No. of Years Life Expectancy</u>
Dominant	25	15½
	26 -50	15½
	51 -75	10½
	75+	5½
Codominant	33	15½
	34 -66	10½
	66+	5
Intermediate	50	5½
	51+	2
Suppressed	Any amount	NG

If top-flagged trees may be considered comparable with broken-topped trees, then use of the above table shows that the average lethally infected tree has about 10 years life expectancy after its top flags. This places time of death for the average lethally infected tree at about 1980 or 30 years hence. Many of the infected trees will live much longer than this, but others are already dead or will die in shorter periods of time.

Trees with advanced infections, streaming pitch where gnawed by rodents, can most often be seen from the ground with the naked eye or by using binoculars, if the observer carefully examines the crown on all sides, circling the tree at some distance from the stump. Lethal branch infections and young trunk cankers cannot be seen from the ground with any degree of regularity. Using 6x30 binoculars with coated lenses about one-third of the lethal infections were detected from the ground, these mostly trunk cankers in the advanced stages. These facts lead to the conclusion that if partial cuts are at relatively short intervals, the poor risk trees with advanced infections can be marked for cutting and salvaged. Salvage of trees with hidden lethal cankers will depend on making frequent examinations of the stands followed by partial cuts as necessary.

It is apparent that the findings of the survey for rust damage in mature western white pine are of great importance to timber managers working with cuttings and cutting plans of the stands affected. Discussions between timber management personnel of the St. Joe National Forest, the Regional Office, and the Blister Rust Control, BEFQ, are scheduled for this winter. The survey findings will be discussed and possible revisions in timber management plans considered at that time. Probably of importance in these discussions will be the range of losses in years and the cumulative losses for successive years. It may be possible to develop pathologic-economic rotations based upon survey findings and the economic factors concerned.



## DEVELOPMENT OF RUST RESISTANT WHITE PINE, REPORT FOR 1951

Work on breeding of blister rust resistant western white pines continued with considerable expansion in this region during 1951. As in 1950, the three most active cooperating agencies and their field representatives were as follows: (1) Blister Rust Control, Northwestern Project - R. T. Bingham, Pathologist; (2) Northern Rocky Mountain Forest & Range Experiment Station - A. E. Squillace, Research Forester; and (3) California Forest & Range Experiment Station, Institute of Forest Genetics - J. W. Duffield, Research Forester. A summary of work completed and new work started is outlined below.

1. New selections made: During 1951, seven new, apparently rust resistant (cankerless) western white pines were found on three different old blister rust infection centers in northern Idaho. This brings the total of resistant and partially resistant selections to 66, 56 cankerless trees and 10 trees with 1 or 2 cankers apiece.
2. Grafts of resistant selections outplanted in resistance test plots: Using an experimental design provided by Squillace,  $\frac{1}{2}$ -acre areas within five Resistance Test Plots in northeast Washington, northern Idaho, and northwestern Montana, were planted with grafted resistant trees in the spring of 1951. Graft outplantings actually covered about  $\frac{1}{2}$  acres of the 6- to 7-acre plots, each outplanting containing 216 graft planting spots, spaced at 30 x 30 feet. Squillace and Bingham, with field assistants, made most of the plantings. Figure 2 shows one of the five Resistance Test Plots.

Grafts from 31 of the better resistant trees were included in the plantings. They were selected survivors among some 2,300 grafts made by Bingham in the greenhouse in the winter of 1950-51, plus some 600 grafts made in the winter of 1949-50. Certain selections grafted readily, with up to 80 percent survival prior to outplanting. Others grafted very poorly, with as low as 10 percent survival. The same trees grafted well, or poorly, in two successive years' grafting work, also when grafted by Duffield at the Institute of Forest Genetics. Over-all grafting survival was about 60 percent, under routine procedure (2-2 nursery stocks potted in 4-inch tarpaper pots. Veneer grafting in a 60-70° F. sweatbox for 2 to 3 months, grafting cuts made in the youngest possible tissues).

Each of the 5 plots established this spring contains planting spots for 6 grafts of each of 36 different resistant selections. Aside from a few losses, 186 of the 216 planting spots on each plot have now been planted with grafts of the 31 different resistant trees. Thirty spots remain to be planted with grafts of five newly found trees. Altogether, 1,080 grafts, 30 each from 36 selections, will eventually be planted. Planting spots were spaced at 30 x 30 feet, to encourage maximum crown development and early fruiting of the grafted trees. Each spot contains the grafted tree, an ordinary 2-2 control seedling, and ribes of two species (Ribes lacustre and R. viscosissimum). Figure 3 shows this planting arrangement.

In addition to graft outplantings made within this region, 6 lots of 12 grafts and 12 control seedlings were shipped to cooperators in southern Oregon, northern Oregon, British Columbia, Wisconsin, Ontario, and New York. These should serve to strengthen our tests on resistance of the clone-members of various

resistant trees; even more important, they may aid in determining whether or not physiologic races of blister rust now exist, differing in their pathogenicity upon western white pine between this and other blister rust regions. Grafted resistant trees will be shipped in the spring of 1952, for use in the work on physiologic races of blister rust now underway under Dr. Stakman at the University of Minnesota Federal Rust Laboratory.

3. Additional controlled pollinations made among resistant trees: During the spring of 1951, Duffield, Squillace, and Bingham again worked together making controlled pollinations among resistant selections. This year 33 new crosses between pairs of resistant western white pines, or between resistant western white pines and other resistant white pines, were attempted, as outlined below.

<u>Seed Parent</u>	<u>Pollen Parent</u>	<u>Number of Crosses Attempted</u>
Resistant <u>Pinus monticola</u>	Resistant <u>P. monticola</u>	22
Resistant <u>P. monticola</u>	Resistant <u>P. strobus</u> (A. J. Riker trees, Wis.)	4
Resistant <u>P. monticola</u>	<u>P. griffithii</u> (excelsa)	2
	(Inst. For. Genetics Arboretum)	
Resistant <u>P. monticola</u>	<u>P. koraiensis</u> Arnold Arboretum	3
	<u>P. peuce</u> )	2
		<u>33</u>

This is roughly one-third of the amount of pollination work accomplished in the spring of 1950. 1951 was a very poor year for pollen and flower production in western white pine in this region. Late frosts may have caused flower bud failure and probably resulted in the many aborted pollen catkins seen on selections which had been prolific pollinators in 1950. At any rate, as small as the pollination program was, an acute pollen shortage developed. The shortage was relieved by importing and using pollens of white pines other than western white pine. The shortage of resistant western white pine pollens was unfortunate in another respect, i.e., of some 25 crosses between resistant trees planned to produce progenies useful for both resistance and vigor and quality testing, only one could be made. Seed from the crosses made in 1951 will be collected in the fall of 1952, and planted in the spring of 1953, according to the same plan outlined below under progeny testing work.

4. Seed of 1950 controlled pollinations collected and divided among cooperators: The job of collecting, extracting, cleaning, and counting seed of the 1950 controlled pollinations was completed by Bingham and the staff of the St. Joe Blister Rust Control Operation in September 1951. Of 93 different crosses attempted, 85 yielded apparently sound seed. Seventy-eight of the 85 successful crosses gave seed in amounts adequate for F<sub>1</sub> progeny resistance testing. Among the 78 crosses providing adequate seed for a full-scale test are 74 resistant P. monticola x resistant P. monticola crosses, 3 resistant P. monticola x resistant P. strobus crosses, and 1 resistant P. monticola x ordinary P. strobus cross. 1950 and 1951 seed collections also provided 16 lots of wind pollinated seed from resistant P. monticola selections, which, with 3 lots of ordinary P. monticola seed, will serve as controls in the progeny trials. All resistant tree seed on hand has been divided by Bingham and Squillace three ways among the





Photos by R. T. Bingham

Figure 1. Above, general view of graft outplantings on the Elk Creek Resistance Test Plot, Clearwater County, Idaho. About  $\frac{1}{2}$  acres are planted with grafts of some 30 different rust resistant selections, 2 acres remain unplanted for later use in resistant tree progeny testing. Below, detailed view of graft planting spot showing graft at tagged planting spot stake protected from animals and snow by tripod of short stakes, *Ribes viscosissimum* plant (left foreground), *R. lacustre* plant (right center), and control seedling (right foreground).





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Figure 2. Rust resistant western white pine selection number 19, Crystal Creek, Benewah County, Idaho, with cone bags in place to protect controlled pollinated cones from insects and rodents. Pollinated 7/4-20/50, cone-bagged 5/2/51, cones collected 9/10/51.





principal cooperators: first priority (sufficient of every seed lot) being given to the Blister Rust Control for resistance testing, second priority (48 seed lots) to the Northern Rocky Mountain Forest & Range Experiment Station for vigor and quality testing, and third priority (20 seed lots) to the California Forest & Range Experiment Station's Institute of Forest Genetics for use as they see fit. Seed extraction and cleaning was all done by hand to insure maximum seed yield. Cutting tests following hand winnowing of several seed lots showed 100 percent of the seed removed as blind actually blind, 99-100 percent of the seed retained as sound actually sound.

5. Work on  $F_1$  progeny resistance testing started: Using the 78 lots of controlled pollinated seed, 16 lots of wind pollinated seed, and 3 lots of ordinary (control) seed, work in determining resistance of  $F_1$  seedlings from crosses among resistant selections has already been started at Spokane. An experimental design developed by Squillace and approved by other cooperators, consisting of three randomized blocks, on each of three Resistance Test Plots, will be employed. Each randomized block will contain one 10-seedling row of each of the 94 controlled and wind pollinated progenies under test, plus three 10-seedling rows of each of the ordinary (control) progenies, a total of 103 10-seedling rows. Thus, in each of the three blocks on each plot each progeny will be represented by 30 seedlings, controls by 90 seedlings. Using a 1 foot x 1 foot spacing within and between rows, each 3-block plot will cover an area about 110 feet x 50 feet when finally outplanted, with ribs between and around the blocks. Space for these progeny trials is already available alongside the graft outplantings in the Resistance Test Plots.

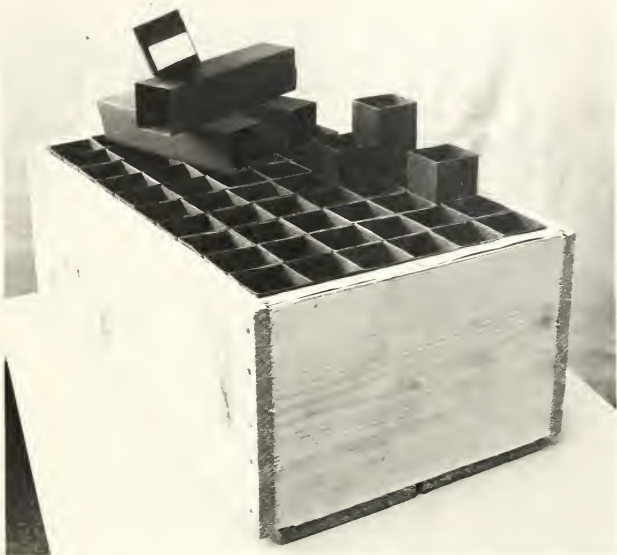
The somewhat ponderous job of seeding, transplanting, and outplanting the more than 9,000 seedlings of the 100 progenies under trial should be considerably reduced by the following procedures: Position of each progeny row within each of the nine blocks eventually comprising the three field plots has already been determined by random drawings. Deep cedar flats have been constructed, each holding sixty 1-3/4" x 1-3/4" x 8" deep, heavy tarpaper plant bands. Plant bands are in six 10-band rows in the flats, corresponding to six of the 10-seedling rows of different progenies, eventually to be planted in the randomized blocks in the field. About 155 of the specially divided flats were required to handle the 927 10-tree rows (9,270) seedlings eventually to be tested. Figure 4 shows one of the specially constructed flats. In the nursery phases of the work, flats will be dug in level with the ground line after seeding the 60 compartments in each with 10 or more seed of each of the 6 different progenies. Once planted they will be treated like any other forest nursery seedlings: given water, weeding, and seedling replacements from surplus seed beds as required. The big advantage of this method should show up at the time of outplanting 2 years hence. Instead of having 927 lots of bare-rooted seedlings to dig from the seed beds, to wrap in wet burlap, and to keep track of while transplanting operations are under way, it will be possible to merely load flats for a given plot onto a truck, drive to the Resistance Test Plots, break open one side of the flats, and plant the balled-root seedlings as already arranged in the flat in the order they are to go into the ground. There is much to be learned about the practicality of this method. It is troublesome to start with, but it should pay large dividends at transplanting time, both in ease of transplanting and, more important, in survival of seedlings once transplanted.

The nursery for handling seedlings is already being prepared at Spokane, Washington. In Spokane it will be possible to take advantage of a 2- to 4-week longer growing season than enjoyed in the heart of the white pine type; also, it will be easier to give the seedlings the close periodic attention they will require. Flats are already filled with fertilized forest soil and will be planted and moved to the nursery as nearly as possible in the spring of 1952.

Seed of all progenies to be tested are now ready to be stratified in sand filled, sausage casing packets. Preliminary stratification trials indicate that the Institute of Forest Genetics' method of stratifying many small lots of seed in these small packets between layers of moist peat moss in large, loosely sealed canisters, is a safe and efficient method for securing a rapid and high degree of germination in western white pine seed. Stratifications will commence about mid-January, so that seed will be available after a 90-day stratification period, about mid-April or soon thereafter.

6. Reports in preparation: An article on tree-breeding activities among rust resistant western white pines, slanted at the Journal of Forestry, is now in preparation by Bingham, Duffield, and Squillace. Bingham is now preparing an Office of Blister Rust Control Serial Report covering the details of the resistant tree breeding work. Both reports should be ready for editing this winter.

7. Cooperation: Aside from the willing help and sound advice given by active co-operators Duffield and Squillace, the assistance and facilities offered by the staff of the St. Joe Blister Rust Control Operation and by the staff of Savenac Nursery deserve special mention. The entire staff at these stations has helped in many ways, materially advancing our resistant tree breeding program. Much of the help received has been in the form of contributed time. It can be seen from the foregoing summary that cooperation in the form of supplying pollens, in making graft outplantings, and elsewhere, has been excellent.



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Figure 3. Special deep flats to be employed in handling seedbed and transplanting phases of progeny tests. Tarpaper plant bands will be filled with fertilized forest soil. Each flat contains 60 compartments, arranged to correspond to six 10-seedling rows in subsequent field progeny test plantings. Serially numbered flats are tagged along the edge of one end to indicate position of various 10-seedling rows of progenies, position being assigned according to randomizations eventually employed in field tests.



## PHOTOGRAPHIC AND EDUCATIONAL WORK, 1951

By

Frank O. Walters, Assistant Project Leader

H. Miller Cowling, Photographic Specialist

### Photographic

The photographic section continued to serve all the departments of this office, reproducing tables, maps, charts, drawings, and pictures to meet the needs of each department. Examples of work are contained in this report.

An additional method of reproducing maps on film was introduced in conjunction with the blackline printing method. The film positives enable the draftsmen to change data on record maps without damage to the film, a procedure not possible with tracing cloth.

### Educational

The Showboat covered all of the blister rust control camps on roads in this region, showing the regional blister rust film and other films pertaining to forest operations. The motion picture "A Destructive Invader" was shown 33 times to 1,874 people.

During the past year, exhibits were presented at two important fairs. Some 50,000 people attended the Sportsmen's Fair in Spokane, Washington, most of whom viewed the blister rust exhibit. The display at the Kitsap County Fair at Port Orchard, Washington, marked the first time that a blister rust exhibit has appeared at a fair on the west side of the state. In general, white pine constitutes only 1 percent of the west side timber type, but there are many small, scattered stands with high percentages of white pine. The display created much interest, and many people remarked that this was the first time that they had been able to find out what had been killing their white pine. The motion picture "A Destructive Invader" was shown at regular intervals as a part of a general showing of educational motion pictures. Practically all of the 17,000 people visiting this fair saw the exhibit, and 500 attended the motion picture showings. A feature of this year's exhibit that created interest and gave rise to numerous questions was a series of pictures dealing with the disease resistant white pine breeding project.

Simple collapsible, easily transported display panels and other props have been developed that greatly reduce the work involved in setting up and dismantling displays. The Baloptican, a feature of each exhibit, attracts interest and is an excellent means of imparting information. Addition of living material gives the public an accurate idea of the effect of the disease.

By use of a machine known as an Inverter attached to the battery of a car, 35 mm. colored slides were shown at several remote blister rust camps to illustrate talks on the blister rust control program. Workers in these camps are largely college students from all sections of the country, and it is worth while to make every effort to thoroughly acquaint them with the program. The training program will be greatly benefited by supplementing the present one with a series of colored slides demonstrating certain phases of the work.



**PHOTOGRAPHIC, BLACKLINE, MULTILITH, AND MIMEOGRAPH WORK**

<u>Item</u>	<u>Northwest- ern Project</u>	<u>Pacific Coast Project</u>	<u>Other Govt. Agencies</u>	<u>Total</u>
<b>PHOTOGRAPHIC</b>				
Lantern slides, natural color, 3x4 $\frac{1}{2}$	78			78
Lantern slides, natural color, 2x2	146			146
Films developed, field films	103		4	107
film packs	5			5
Copies, 5x7	9	1		10
8x10	104	112	608	824
Printing, 4x5 or smaller	79	60		139
5x7	1,858	68		1,926
8x10	2		4	6
9x11	490	52	11	553
Enlarging, 5x7	18			18
8x10	4			4
11x14	20			20
16x20		24		24
23x34	2			2
Total Items	2,918	317	627	3,862
<b>BLACKLINE</b>				
Total Maps Printed	1,470	—	—	1,470
<b>MULTILITH</b>				
Duplimats	147			147
Plates	83	112	20	215
Cards printed	3,200	2,000	1,500	6,700
Sheets printed	65,910	49,000	6,800	121,710
Total Multilith Items	69,340	51,112	8,320	128,772
<b>MIMEOGRAPH</b>				
Stencils	46			46
Sheets printed	7,470			7,470
TOTAL All Items	81,244	51,429	8,947	141,620





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Exhibit used at fairs. Panel shown on right folds into easily transported package. Pictures are placed in special containers. Baloptican partially visible in extreme left background.



ORGANIZATION OF THE NORTHWESTERN PROJECT OFFICE - 1951

1. Project Leader in Charge, H. E. Swanson
2. Assistant Project Leader, F. O. Walters
3. Cooperative Local Control:
  - a. Clearwater Operation, Idaho:
    - Operation Supervisor, M. C. Riley
    - Assistant Operation Supervisor, H. J. Faulkner
    - Camp Superintendent, William Holland (Fur. eff. 10/30/51)
  - b. St. Joe Operation, Idaho:
    - Operation Supervisor, H. J. Hartman
    - Assistant Operation Supervisor, W. F. Painter
    - Unit Supervisor, Donald F. Williams
    - Special Duty Assistant, R. E. Myers
    - Automobile Mechanic, L. C. Miller
    - Camp Superintendent, A. E. Turner (Fur. eff. 11/13/51)
  - c. Coeur d'Alene Operation, Idaho:
    - Operation Supervisor, F. J. Heinrich
  - d. Kaniksu Operation, Idaho-Washington:
    - Operation Supervisor, H. A. Brischle
    - Foreman, R. K. Lindgren (Resig. eff. 7/3/51)
    - Supervisory Control Aid, J. C. Gonyou
    - Checker Foreman, Quentin W. Larson (Appt. eff. 10/15/51)
  - e. Montana Operation:
    - Operation Supervisor, A. S. Skoglund
  - f. National Parks, Washington-Montana-Wyoming-Colorado:
    - Operation Supervisor, J. C. Gynn
    - Assistant Operation Supervisor, C. M. Chapman
4. Education and Information:
  - H. Miller Cowling, Photographic Specialist
5. Business Administration and Clerical:
  - S. J. Dorick, Administrative Assistant (Trans. to Region II eff. 7/1/51)
  - M. L. McWold, Administrative Assistant (Retirement eff. 12/31/51)
  - L. E. Klatt, Administrative Assistant
  - E. K. LaPrey, Storekeeper
  - M. P. Kirsten, Clerk
  - M. C. Yourt, Clerk (Trans. to O.P.S. eff. 6/29/51)
  - A. B. Treffry, Secretary (Steno.)
  - J. L. Radkey, Clerk-Typist

Developmental and Improvement (Project Leader, H. R. Offord, Berkeley, Calif.)  
V. D. Moss, Forest Ecologist  
R. T. Bingham, Pathologist  
J. F. Breakey, Pathologist



APPROPRIATIONS  
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE  
NORTHWESTERN PROJECT, BLISTER RUST CONTROL

Regular Appropriations

Fiscal Year 1951:

Project W-a.14 NW (Administrative)	\$140,000.00	
Project W-e.14 NW (Cooperative)	<u>100,000.00</u>	\$240,000.00

Fiscal Year 1952 (as of 12/31/51):

Project W-a.W (Administrative)	\$120,000.00	
Project W-e.W (Cooperative)	<u>103,000.00</u>	\$223,000.00

Contributed Funds (Deposited with U. S. Treasury)

State of Idaho		\$ 25,000.00	
Clearwater Timber Protective Association	\$6,661.52		
Potlatch Timber Protective Association	5,460.66		
Priest Lake Timber Protective Association	<u>4,192.10</u>	<u>16,314.28</u>	\$ 41,314.28





**FEDERAL EXPENDITURES, NORTHWESTERN PROJECT, BLISTER RUST CONTROL  
CALENDAR YEAR 1951, REGULAR APPROPRIATIONS**

	Operation	Salaries	Expense	Total
<b>January 1 to June 30, 1951</b>				
I	Planning, Coordination, Technical Direction			
1.1	- Clearwater Operation, Idaho	\$ 6,885.09	\$ 258.07	\$ 7,143.16
1.2	- St. Joe Operation, Idaho	10,582.14	693.07	11,270.21
1.3	- Coeur d'Alene Operation, Idaho	3,202.29	46.36	3,248.65
1.4	- Kaniksu Operation, Idaho	6,207.93	83.44	6,291.27
1.6C	- Cabinet Operation, Montana	1,601.14	602.04	2,203.18
1.6K	- Kootenai Operation, Montana	1,601.15	602.04	2,203.19
1.7	- National Parks	5,334.46	1,539.89	6,874.35
	Office Maintenance, Supervision, Investigations, and Educational	25,352.96	9,106.45	34,459.41
	Total, Project I, Jan. 1-June 30, 1951	\$ 60,767.06	\$ 12,926.36	\$ 73,693.42
III	Cooperative Ribes Eradication on State and Private Lands			
3.1	- Clearwater Operation, Idaho	\$ 4,067.22	\$ 5,429.40	\$ 9,496.62
3.2	- St. Joe Operation, Idaho	2,406.99	6,454.51	8,861.50
3.4	- Kaniksu Operation, Idaho	5,684.01	4,365.99	10,050.00
	Total, Project III, Jan. 1-June 30, 1951	\$ 12,158.22	\$ 16,249.90	\$ 28,408.12
<b>July 1 to December 31, 1951</b>				
I	1.1 - Clearwater Operation, Idaho	\$ 5,854.17	\$ 485.49	\$ 6,339.66
	1.2 - St. Joe Operation, Idaho	9,777.94	1,009.29	10,787.23
	1.3 - Coeur d'Alene Operation, Idaho	3,393.94	209.58	3,603.52
	1.4 - Kaniksu Operation, Idaho	7,480.08	284.93	7,765.01
	1.6C - Cabinet Operation, Montana	1,668.11	183.59	1,851.70
	1.6K - Kootenai Operation, Montana	1,668.11	183.59	1,851.70
	1.7 - National Parks	5,711.04	1,281.40	6,992.44
	Office Maintenance, Supervision, Investigations, and Educational	19,646.46	1,748.03	21,394.49
	Total, Project I, July 1-Dec. 31, 1951	\$ 55,199.85	\$ 5,385.90	\$ 60,585.75
III	3.1 - Clearwater Operation, Idaho	\$ 23,680.54	\$ 4,048.59	\$ 27,709.13
	3.2 - St. Joe Operation, Idaho	22,231.33	4,259.32	26,490.65
	3.4 - Kaniksu Operation, Idaho	10,721.60	2,570.59*	13,292.19
	Total, Project III, July 1-Dec. 31, 1951	\$ 56,633.47	\$ 10,878.50	\$ 67,491.97
	Grand Total, Calendar Year 1951	\$ 184,738.60	\$ 45,440.66	\$ 230,179.26

\*Includes fiscal year 1950 ribes eradication contract, \$711.21, paid August 1951.























